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ABSTRACT

Developed primarily from field based research on 19 schools, the book is designed to help facility planners, educational administrators, educators, architects, and citizens make informed choices in planning new or renovated facilities for special education services. The design guidelines are performance based so that intended outcome is given as the criterion rather than the means for achieving that outcome. Chapter 1 examines current directions of special education and the delivery of services for exceptional learners. Basic concepts behind special education programs are outlined. The second chapter deals with the educational facility planning process. Long range educational facility planning is addressed, and planning for new or renovated facilities is discussed. Consideration is given to the facility planning committee, their roles and responsibilities, a participatory model for involvement, organizing the planning process, and steps in the facility planning process. Chapter 3 contains design criteria which are organized into two sections: general building design criteria which is related to the building in its entirety (including accessibility, furniture and equipment, and lighting); and design criteria by special education services (which involve curriculum services and such related services as physical therapy). Chapter 4 is an annotated listing of additional readings directly related to facility design programming or planning. (SBH)

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A Guide for Planning New and Renovated Schools

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Foreword

Facility planning and design are of paramount importance in meeting the goal of providing educational opportunity for all handicapped children. Creating appropriate physical environments to support special education services can only come from planning on the basis of sound criteria. The research project which led to this document was funded by the Office of Education in an effort to contribute to the data bank of criteria available for facility planning.

This guide is designed to help facility planners, educational administrators, educators, architects, and citizens make in-

formed choices about the types of facilities they will provide for special education services. The criteria in this guide were developed from field research with the users of school buildings—administrators, teachers, and students—as the primary source of information. The criteria are not a blueprint or an attempt to standardize facilities but rather the identification of points to consider in the planning process.

It is our sincere hope that this guide will make a significant contribution to the facility planning process and, in turn, provide exceptional facilities for future programs.

Edwin W. Martin
Deputy Commissioner
Bureau of Education for the Handicapped
U.S. Office of Education
Department of Health, Education, and Welfare

Preface

The purpose of this guide is to assist educators, architects, facility planners, parents, and students in planning new or renovated facilities for special education services. The guide does not seek to standardize facilities, but rather to provide a basis for informed choices.

This publication is directed primarily to those responsible for planning education facilities. However, the organization and format of the material should make it a useful tool for anyone concerned with facility planning for special education.

NEED FOR DESIGN GUIDELINES

The courts and the state and federal legislatures have mandated the right of all handicapped children to a free public education in the least restrictive environment. This mandate is having an enormous impact on educational programs and facilities. Increasing numbers of children with mental, physical, learning, emotional, and multiple handicaps are being placed in the public schools, which in many cases must be designed or modified to meet the needs of these new students. The problem in achieving this is twofold. First, most existing schools do not provide an environment that readily supports the specific educational programs and services required for handicapped students. Second, there now exists insufficient design criteria for renovating existing facilities or for constructing new facilities. A comprehensive guide to planning and designing appropriate educational facilities is not available.

A study by Abeson and Blacklow (1971) indicated that "the majority of facilities being used for special education were not originally planned for that purpose. Consequently, the programs within those facilities operate in spite of the environment rather than in response to it" (p. 19). Recommendations that followed this study included (a) training of educational administrators in the planning of special education facilities and (b) the need for architectural research including an evaluation of the ways special education facilities are used.

The need for design criteria indicated by the Abeson and Blacklow (1971) study still exists today. One of the main topics of environmental research in the United States is barrier free architecture. The barrier free design criteria prepared by the American National Standards Institute (ANSI, 1961) are available and generally accepted. Barrier free design standards deal with such topics as entrances, exits, parking, lavatories, telephones, drinking fountains, and traffic patterns within a building. Although these elements are extremely important, they represent only a small number of architectural design variables. Variables such as space, space relationships between activities, acoustics, lighting, climate, furniture,

equipment, utilities, storage, and display also need to be considered. Designing a school building that only eliminates architectural barriers or just meets ANSI standards merely touches the tip of the iceberg in the effort to achieve a facility that is functional for handicapped individuals. In addition, the barrier free standards (ANSI, 1961) were based primarily on research conducted with adults with physical disabilities. In designing an educational facility, other age groups and handicaps must also be considered.

Most design criteria for the handicapped person are equally applicable to the nonhandicapped person. The difference is one of degree. While the average person can usually adapt to design compromises, the handicapped person may be more dependent upon strict adherence to careful environmental design.

This guide is an outgrowth of a research study conducted by the Maryland State Department of Education pursuant to a 2½ year grant from the Bureau of Education for the Handicapped, US Office of Education, Department of Health, Education, and Welfare.

The primary objective of the project was to provide a guide developed primarily from field based research for the planning and construction of public school facilities that would be responsive to the needs of special education programs.

The design guidelines in the document are performance based, so that intended outcome is given as the criterion rather than the means for achieving that outcome. This demands a creative response on the part of educators and architects, since few solutions are given. The criteria are inherently more flexible for writing educational specifications and programs as well as in evaluating proposed facility plans.

The primary methodology for developing these criteria was the evaluation of existing special education facilities. A total of 19 schools from 10 of the 10 standard federal regions were visited for data collection.

A typical field methodology was developed and was adjusted as necessary by the circumstances of the particular school and the schedules of the personnel and researchers. The first day was spent in getting oriented to the facility, deciding which spaces to evaluate, and analyzing the environmental characteristics of those spaces. The second day was spent primarily in behavioral observation of the chosen spaces. The third day was spent primarily interviewing teachers, aides, and students to obtain their evaluations of the spaces.

The research relied upon teachers as the primary evaluators of educational spaces, but evaluations by teachers' aides and students were also recorded. Evaluations of the overall

facility were obtained from administrators. A total of 166 teachers were interviewed, in addition to many aides, administrators, and students at each school. Expert opinion and literature sources were added to these data as they were analyzed and synthesized. The design criteria in Chapter 3 of this guide were synthesized from the results of this data analysis.

The instructional areas, particularly the general instructional area, received the most emphasis. Related service spaces and support service spaces were given a second priority. A sincere effort was made to maintain a balance in terms of the handicapping conditions addressed and the specificity of the environmental and design criteria.

More detailed information concerning the research methodology can be found in the appendix.

ORGANIZATION AND USE OF THE GUIDE

The guide contains four chapters: Special Education Programs, The Facility Planning Process, Design Guidelines, and Additional Readings.

Chapter 1 examines current directions of special education and the delivery of services for exceptional learners. Basic concepts behind special education programs are outlined and serve as the programmatic basis for the facility guidelines provided in Chapter 3.

The second chapter deals with the educational facility planning process. It first addresses long range educational facility planning, and then looks at planning for new or renovated facilities. The latter discussion considers the facility planning committee, their roles and responsibilities, a participatory model for involvement, how to organize the planning process, and the steps in the facility planning process.

Chapter 3 contains design criteria developed primarily from the results of field research. These criteria are organized into two sections.

Section 1, General Building Design Criteria, is related to the building in its entirety. The topics include accessibility, space and spatial relationships, storage, furniture and equipment, display, surfaces, lighting, acoustics, climate, utilities, fire safety, outdoor play areas, and flexibility.

Section 2, Design Criteria by Special Education Service, is organized by special education service. Design criteria are discussed for the following services: (a) curriculum services, including general instructional area, art, home living skills, industrial arts, physical education, music, science, and resource; and (b) related services, covering physical therapy, occupational therapy, and speech-language pathology. All special education services are not studied within the scope of this project.

Most of the design criteria presented in Chapter 3 are based on research data from the project. Some additional criteria were developed from other sources, which are referenced. It should be noted that these guidelines do not discuss all the possible services provided in special education. The parameters of the project limited this document to addressing 11 service areas.

The design guidelines should be viewed as a basis from which to begin planning rather than as the end of the problem solving process. They can be used to define topics that need addressing, identify questions that require answers, and suggest alternative solutions.

The design guidelines are for the planning of renovation and/or new construction projects. They can be used in developing educational specifications for a particular project. The guidelines can also be used as the basis for evaluating existing facilities. Various checklists can be developed directly from the statements in Chapter 3.

The guide intentionally avoids using the traditional special education categories as the primary basis for organizing the design guidelines in Chapter 3. Early in the project it was decided to collect data and organize information primarily by special education services and environmental variables. This parallels one emphasis of Public Law 94-142 requiring an individualized education program for every handicapped child. The individualized education program emphasizes the identification of appropriate services to meet the specific educational goals and objectives for each child.

Chapter 4 is an annotated listing of additional readings directly related to facility design programming or planning.

NEED FOR ADDITIONAL RESEARCH

This study attempts to advance the state of the art, but more work is needed. Other research groups and governmental sponsors should continue and encourage this type of facilities research. The study can and should be replicated to confirm or extend its findings. Facility guidelines for service areas not covered in this document are needed and should be developed. Furthermore, basic research is needed regarding how individuals with various handicaps perceive and interact with the physical environment, and innovative design solutions should be evaluated and reported.

The postoccupancy evaluation methodology developed for this research project could be used by other groups or researchers. It is a valid data gathering method providing reliable and meaningful information that is easily translated for user implementation.

These guidelines are a tool and do not guarantee a functional or appropriate facility. They must be used in concert with an effective participatory planning and design process as described in Chapter 2.

Special education programs and services are predicted to change over the next decade or two. These changes are related to variations in the population to be served (older and younger students, more severely handicapped) and the location and environment in which the activity will occur (least restrictive environment). As new or renovated facilities are planned and designed, some measure of flexibility must be addressed to allow for modifications as they are needed.

The facility evaluation, which includes users and experts, can provide valuable information that can assist others as they begin to plan. The sharing of information from post-occupancy evaluations will better enable facility planning to meet the ever changing needs of handicapped students.

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CHAPTER 1

Special Education Programs

As a result of social, judicial, and legislative mandates, educational service delivery to handicapped children is moving in new directions. The Education for All Handicapped Children Act of 1975, Public Law 94-142, requires that every state and its localities, in order to continue receiving funds under this act, make available a free, appropriate public education to all handicapped children, ages 3 through 21, in the least restrictive environment. Section 504 of the Vocational Rehabilitation Act of 1973, Public Law 93-112, is a basic civil rights provision ordering full program accessibility. The Section 504 regulations prohibit recipients of federal financial assistance from excluding handicapped children from an education program. Both laws in essence are making the same fundamental requirement of a free appropriate public education.

The mandate for equal educational opportunity for handicapped children presents an opportunity for all children. Traditionally, special education is synonymous with such concepts as early and continuous intervention, individualized education programs, interagency cooperation, parent involvement, and differentiated staffing.

Mandating these concepts for the handicapped and integrating handicapped children into the public school setting can have the residual effect of improving programs for non-handicapped children as well. The implementation of Public Law 94-142 and Section 504 of the Vocational Rehabilitation Act of 1973 can well prove to be a Bill of Rights for all children.

In order to understand the effect of the acts and their implications for facility planning and design, one must first understand what children are considered handicapped.

DEFINITION OF TERMS

The Education for All Handicapped Children Act defines handicapped children as mentally retarded, hard of hearing, deaf, speech impaired, visually handicapped, seriously emotionally disturbed, orthopedically impaired or other health impaired children, or children with specific learning disabilities who by reason thereof require special education and related services. (20 USC 1401)

As used in Public Law 94-142, the term *handicapped children* entails two criteria. The child must have one or more of the disabilities indicated and he or she must require special education and related services. In other words, not all chil-

dren who have a disability require special education; some are able to and should attend school without any program modification. The following definitions further describe the handicapping conditions.

- **Deaf.** A hearing impairment so severe that the child cannot understand what is being said with or without a hearing aid.
- **Deaf-blind.** A combination of hearing and visual impairments causing such severe communication, developmental, and educational problems that the child cannot be accommodated in either a program just for the deaf or one that is specifically for the blind.
- **Hard of hearing.** A hearing impairment that adversely affects a child's educational performance but is not as severe as deafness.
- **Mentally retarded.** Both significant subaverage general intellectual functioning and deficits in adaptive behavior; these deficits should have been observable throughout the child's development.
- **Multiply handicapped.** A combination of impairments, other than deaf-blind, that causes such severe problems that the child cannot be accommodated in a special education program for any one of the impairments.
- **Orthopedically impaired.** A severe physical disability that adversely affects educational performance. The term includes impairments such as club foot, absence of a limb, cerebral palsy, poliomyelitis, and bone tuberculosis.
- **Other health impaired.** Limited strength, vitality, or alertness due to chronic or acute health problems such as rheumatic fever, asthma, hemophilia, or leukemia, which adversely affects the child's educational development.
- **Seriously emotionally disturbed.** Schizophrenic or autistic children and others who have a marked degree of one or more of the following characteristics, displayed over a long period of time: (a) an inability to learn which cannot be explained by intellectual, sensory, or health factors; (b) an inability to build or maintain satisfactory interpersonal relationships; (c) inappropriate types of behavior or feelings under normal circumstances; (d) a general pervasive mood of unhappiness or depression; (e) a tendency to develop physical symptoms or fears associated with personal or

school problems. This term does not include students who are socially maladjusted, unless they are also seriously emotionally disturbed.

- **Specific learning disability.** A disorder affecting the child's understanding or use of spoken or written language. The student's ability to listen, think, speak, read, write, spell, or do mathematical calculations may be affected. Conditions such as perceptual handicaps, brain injury, minimal brain dysfunction, dyslexia, and developmental aphasia are included in this category. This term does not include children who have learning problems that are primarily the result of visual, hearing, or motor handicaps; mental retardation; or environmental, cultural, or economic disadvantage.
- **Speech impaired.** A communication disorder, such as stuttering, impaired articulation, a language impairment, or a voice impairment, that adversely affects a child's educational performance.
- **Visually handicapped.** A visual impairment that, even with correction, adversely affects a child's educational performance. The term includes both partially seeing and blind children.

Stating these handicapping categories oversimplifies the situation. Handicapped children present an infinite combination of abilities and disabilities necessitating a variety of service needs.

IDENTIFICATION OF HANDICAPPED CHILDREN

Children suspected of having a handicap are evaluated by a multidisciplinary team that includes at least one teacher or other specialist with knowledge in the area of the suspected disability. Following a full and individual evaluation of the child's educational needs, the team determines whether or not the child requires special education and related services.

THREE BASIC CONCEPTS

Three basic concepts constitute the education rights of the handicapped: zero reject, appropriate education, and least restrictive environment.

Zero Reject

The concept of zero reject is reflected in the Public Law 94-142 stipulation that all handicapped children, including the most severely handicapped, will be provided with a free, appropriate public education. The phrases *all handicapped children* and *including the most severely handicapped* have far reaching implications which alter traditional views related to populations that use public school facilities. Further, Public Law 94-142 mandates that all states shall provide educational programs for handicapped students ages 3 through 21 (by September 1980), unless inconsistent with existing state law or practice. Additionally, some states mandate programming for the handicapped from birth.

Appropriate Education

The term *appropriate* is not defined per se; it receives its definition for each child through the mechanism of the individualized education program (IEP) specified in Public Law 94-142. Every handicapped child receiving special education must be provided with an individualized education program

that indicates what education and related services will actually be provided. The mandate to provide an individualized education program for every child requires that those responsible for the child's education examine each child as an individual. This is central to ensuring that each handicapped child receives a free and appropriate education.

Least Restrictive Environment

This concept refers to the practice of educating a handicapped student in an appropriate educational setting that is as close as possible to the regular or nonhandicapped student's environment. Special classes, separate schooling, or other removal of handicapped children from the regular educational environment is to occur only when the nature or severity of the handicap is such that education in regular classes with the use of supplementary aids and services cannot be achieved satisfactorily. Each state is required to establish procedural safeguards to ensure implementation of the least restrictive environment.

The regulations for Public Law 94-142 require educational agencies to ensure the availability of a continuum of alternative placements for provision of special education and related services. The continuum of placement options that should be available for each curriculum area includes regular class placement, resource room, special class, special school, private day school, institutions, hospitals, homes, and correctional facilities. The setting in which the student will receive 50% or more of his or her instruction is usually designated as the primary placement. In addition to the primary placement, all other services and opportunities remain available for portions of the student's program, depending on what is needed by the child and indicated in the individualized education program.

DELIVERY OF SERVICES

Program Planning

The program for special education must be carefully planned. There are many factors that require consideration, and some of these are discussed here.

Early and Continuous Intervention

Active CHILD FIND systems are necessary which identify, screen, and educationally assess children with handicapping conditions. The very concept of zero reject implies that no child who is handicapped will be without the advantage of an educational program.

Individualized Education Program

Once an individual is identified and his or her needs assessed, an individualized education program must be developed and reviewed yearly for that child. The individualized education program is a written comprehensive statement describing the special education needs of the child and the services to be provided. The goals, objectives, activities, and materials are adapted to the needs, interests, and abilities of each student.

The individualized education program is developed in a meeting by one or more representatives of the local educational agency; the parents or guardians; the child's teacher or

teachers; the student, when appropriate; and, when feasible, other persons directly responsible for the implementation of the individualized education program.

The individualized education program for each child should include:

1. A statement of the child's special education needs and present levels of educational performance.
2. A statement of annual goals, including short term instructional objectives.
3. A statement of the specific special education and related services to be provided to the child and the extent to which the child will be able to participate in the general education program.
4. The projected dates for initiation of services and the anticipated duration of the services.
5. Appropriate objective criteria and evaluation procedures and schedules for determining, on at least an annual basis, whether the short term instructional objectives are being effectuated.

Continuum of Services

With a wide range of student ages, abilities, and specific learning needs and disabilities, a corresponding wide range of settings must be provided to meet the goal of least restrictive environment. However, at one time most programs provided an either-or situation: Either a child was placed in a general program or the child was placed in a special program.

The conceptual framework or model for the continuum was first articulated by Reynolds (1962), who established a pyramid in which the base corresponds to the regular classroom and the apex to hospital and treatment centers. The model calls for program delivery systems to be arranged according to the intensiveness of service and severity of the handicapping condition, while emphasizing each child's opportunity to move through the continuum of service, as appropriate, toward a less restrictive environment.

Closely modeling Reynolds' model, Deno (1970) offered a Cascade of Services as a graphic representation of program options that should be available for handicapped children. In this conceptualization, levels are introduced to correspond to the level of severity of the child's disability.

Reynolds and Birch (1977) further developed the cascade model by placing emphasis on instructional diversity, with implications for fewer specialized places and more diverse regular places. Regular teachers would be trained to be resourceful in managing a diverse environment to serve a broad range of student needs. Some separate specialized and limited environments would still remain. However, children would be placed in specialized environments only for educational purposes. This model is conceptualized in Figure 1.

The states of Minnesota, California, Maryland, Massachusetts, New York, and Pennsylvania have adapted and/or developed model delivery systems that emphasize placement of children in the least restrictive environment and are based upon services needed rather than categorical handicapping conditions. An example of this is Maryland's *Levels of Service* depicted in Figure 2. In this model, children are served in one or more of the six levels of varying intensity of service, according to individual needs indicated in their in-

dividualized education program. Level 1 provides the greatest opportunity for participation in the regular education classroom and is the least restrictive placement in which handicapped children may receive services needed.

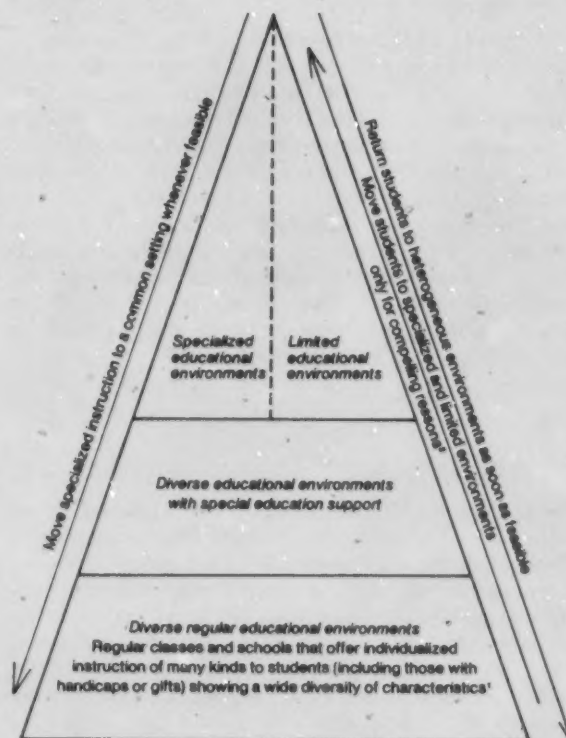
Cooperation with Other Agencies and Individuals

Public school systems alone cannot meet all the needs of handicapped children. To provide necessary services, public school officials and staff must work closely with other agencies and individuals. If cooperative efforts are explored, resources can be optimally used and duplication minimized.

Boards of education should form alliances with local and state agencies and individuals including, but not limited to, departments of health, parks and recreation, and social services, as well as psychologists, physicians, and therapists. The boards should also develop interdistrict programs. In a large geographic area cooperative efforts may be the only manner in which some services can be economically and efficiently provided.

FIGURE 1

The modified cascade model emphasizes instructional diversity.



¹It is assumed that no educational "place" is impervious to change and development and that through good efforts many of the varieties of specialized and intensive forms of education can be moved into a developing mainstream.

²Here, as in the case of the original cascade, it is assumed that students should be removed from the mainstream only for limited periods and compelling reasons, that when in specialized and limited environments their progress should be monitored carefully and regularly, and that they should be returned to the mainstream as soon as feasible.

Reprinted from Reynolds and Birch, 1977, p. 36.

FIGURE 2

Maryland's levels of service model is based on intensity of service needed.

LEVELS OF SERVICE

RESIDENTIAL SCHOOL

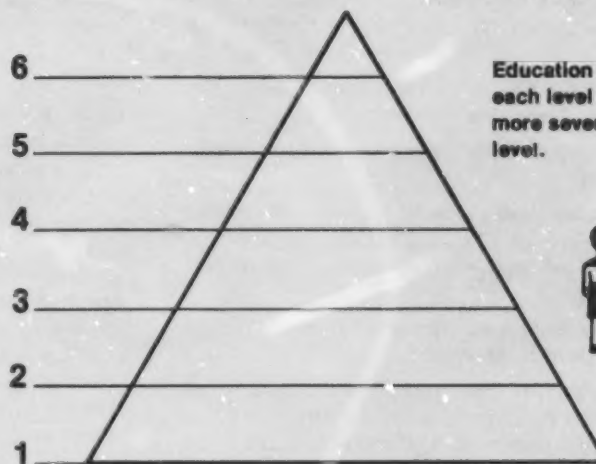
Special class in a special education school

Special class in a regular education school

Intensive resource service—up to 3 hours daily, 5 days weekly

Itinerant or resource service—up to 1 hour daily, 5 days weekly

Consultant services



Reprinted from Maryland State Department of Education, 1979, p. 12.

Parent Involvement

Public Law 94-142 gives parents or legal guardians of handicapped children the right to be informed of all educational decisions regarding identification, evaluation, placement, and programming for their children. The law gives parents the right to participate in educational planning, to accept or reject findings, to make recommendations, and to challenge the decisions through due process procedures. Some school systems have already set up programs to teach parents how to work more effectively with their children and how to help in developing their child's individualized education program. Because of Public Law 94-142, the education of exceptional children has become a cooperative effort, making parents full partners in their child's educational process.

Staffing

Student/Teacher Ratio

The nature of the individual needs of the handicapped child necessitates that the student/teacher ratio be significantly different from that usually encountered in general education programs. The concept of a standard student/teacher ratio becomes obsolete. Instead, ratios ideally are determined by the particular program needs and, to some degree, ages of the students involved. Ratios may vary from one classroom to another, from one service level to another, or may change significantly from year to year as the student age or population changes. It is not unusual to find one teacher working with four children in one area and another teacher with twelve children in another area, depending upon the individual needs of the children involved in the education program.

Teacher Assistance

In any group of handicapped children, the nature and extent of individual differences may vary considerably. The size of a group does not have to be very large before a single teacher

may be unable to meet the individual needs of students for whom he or she has responsibility. In order to provide services economically and efficiently in special education, the staff must consist of a significant number of related service professionals, such as speech therapists, physical therapists, occupational therapists, counselors, psychologists, paraprofessionals, and volunteers. This applies to both the situation where a student is integrated into a regular class and a special class primarily serving handicapped children. When appropriate, interpreters and tutors may also provide teacher assistance.

Inservice Training

Adequate inservice training is essential in order to prepare staff to serve handicapped students effectively. Many of the problems that may occur in implementing the least restrictive environment provision can be overcome with adequate inservice programs. This is particularly important because many handicapped students are in public school settings for the first time.

The following areas or levels of training may be included in inservice training: awareness, knowledge, skill practice, and skill application. Inservice programs are particularly important in correcting the misconceptions typical of our culture regarding exceptional children. For example, people without experience in handicapped awareness activities may form stereotypes of handicapped individuals. Awareness and other training programs can do much to develop positive attitudes, realistic goals, and skills for working with handicapped children.

Facilities

Public Law 94-142 requires that each State Annual Program Plan for the Handicapped, as well as each local education agency's application, describe the facilities necessary to meet the goal of providing full educational opportunities for all handicapped children. Section 504 requires that facilities be

constructed or renovated to enable the handicapped to receive programs needed. In order to meet these mandates, appropriate facility planning and design are of paramount importance. Chapters 2 and 3 of this guide offer guidelines for planning and designing facilities for special education and related services.

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CHAPTER 2

The Facility Planning Process

When educational facilities for the handicapped are being considered, many decisions will have to be made. A planning process should be adopted or adapted to the school district and its particular needs. Input from a wide spectrum of the community, including the users and clients, is recommended.

The planning process can be divided into two major categories: (a) long range educational facility planning and (b) planning for new or renovated facilities. The latter category receives major attention in this guide.

LONG RANGE EDUCATIONAL FACILITY PLANNING

Long range educational facility planning is an activity that can occur on an annual basis or at regularly scheduled intervals of 2, 3, or 5 years. This type of planning takes into consideration the needs of the entire school district.

One of the most important factors to be considered are educational programs and services for handicapped students. These include a review of districtwide programs, national and state trends, and specific projected needs of the school district. Planning should include a detailed outline of educational programs and services to handicapped students in the district.

The plan should contain projected populations and student enrollments; organizational patterns; an evaluation of existing facilities; applicable health, building, and fire code requirements; federal, state, and/or local legislation or regulations that pertain to handicapped students; class size and staffing patterns; school site selection criteria; transportation options; identification of populations to be served (number and severity); and a discussion of financial requirements to implement the long range plan. Program accessibility and student placement must be studied very carefully, along with the particular and specific projected services that the handicapped students will require.

The method and location where the delivery of services takes place may vary. For example, one school district may provide all the required services through employees of the district in school buildings; another district may provide most services in school buildings with some services provided through other local or state agencies in other facilities; still another district could provide most services as well as space for staff members of other community agencies to provide the needed service. The identification of the services re-

quired, the availability of the service, and the cooperative relationships between community agencies are other essential factors to consider.

The long range facility plan can be prepared by qualified staff of the district or by consultants. The plan may include such projects as adding space to existing schools, modifying or renovating existing schools, or building new schools.

PLANNING NEW OR RENOVATED EDUCATIONAL FACILITIES

Planning of any single project should be related to decisions and/or recommendations contained in the school district's long range planning report. The most important components are the educational programs and services required for handicapped students to be served. Consideration should be given to each type of program and service such as general instructional classrooms, music, resource, physical therapy, speech-language pathology, administration, and food service. Part of the review should pertain to curriculum, materials, activities, furniture, and equipment which will be part of each program and/or service.

The following procedures should be considered when planning educational facilities for handicapped students that involve new construction, renovations, or both new construction and renovations. These procedures can be used when planning an educational center for handicapped students or a school where handicapped students are integrated with non-handicapped students.

Giving individuals an opportunity for participation in the decision making process has become a natural part of our culture. The question, then, is not should individuals or groups participate in the decision making process, but rather how can they be involved in the process to ensure the best decisions possible. A participatory model for planning new construction and/or renovation (Figure 1) can lead to facilities that reflect the wide range of backgrounds and experiences of the participants and that are likely to be more responsive to the needs of handicapped students, parents, teachers, and administrators.

The Facility Planning Committee

The facility planning committee should include one or more members from each of the following groups.

FIGURE 1

The participatory model of planning produces facilities more responsive to the needs of their users.



Central Office

1. Superintendent of schools
2. Board of education
3. Educational facility planner
4. Director of special education
5. Other supervisors (subjects or services)
6. Maintenance and operations

School Building Level

1. Principal, administrator of educational programs for the handicapped and/or nonhandicapped
2. Teachers, of the handicapped and nonhandicapped
3. Students, handicapped and nonhandicapped
4. Parents, of the handicapped and nonhandicapped
5. Aides, of the handicapped and nonhandicapped

Others

1. Citizens
2. Project architect
3. State special education consultants
4. State educational facility planning consultants
5. Consultants from colleges or universities or other school districts

This committee develops the overall philosophy for the project as well as making or determining decisions concerning the program, services, and required facilities consistent with the prior approval of the board of education. The members should bring knowledge and experience in developing special education programs and be aware of the needs of the handicapped population to be served. These members par-

ticipate in the overall activities of the committee and serve on subcommittees which may focus on a particular educational program or service. The following is a sample of roles and responsibilities of committee members.

The superintendent or designated representative, as chief school official, is responsible for decisions concerning the programs, services, and the facility. The facility planner, as expert in both education and facilities, should serve as a resource person to the group by directing decisions and facilitating the planning process. The instructional specialist (director of special education), as the committee expert in special education, should have decision making authority for the special education division and the ability to determine programs and their facility implications.

The school building principal should serve as a general resource, help coordinate the project within the total school program, and guide the group in the effective administration of the school. Teachers should serve as general resources and the specialists as resources in their particular areas of expertise. Both should serve as users who evaluate the programs, equipment, and facilities.

Selected personnel, such as aides and volunteers, should provide guidance in general building usage and assist in decisions related to their areas of expertise. Students should participate to guide the committee toward decisions compatible with their special needs and to assist in decisions.

Parents bring special knowledge and insight concerning the needs and abilities of their child, as well as their own participation in educational planning and development of the individualized education program. The project architect, as the design professional, interprets the educational specifications into drawings and specifications for the construction of the facility and participates on the committee to gain program insights.

State special education and facilities planning consultants assist in transmitting information about new national trends as

well as sharing what other local systems are doing. They may arrange for visitations to outstanding and/or unique programs and/or facilities. Regional state and national association representatives can bring to the committee innovative ideas and information on national trends.

The role of participants should be clearly defined at the beginning of the planning process. The members are input agents making recommendations to the superintendent of schools who in turn will make recommendations to the board of education, the final decision making body. Majority rule and voting on all decisions is not an essential element of the participatory process. Decisions should be made on the basis of facts, information, and the implementation of action toward clearly perceived and valued goals.

An effective planning process does not just happen. Responsibility for the operation and coordination of the planning team and its activities is essential. The superintendent, his or her designated representative, or the school district's educational facility planner could perform this function. Consultants from the state department of education or independent consultants may help to resolve conflicts. The judgment of the superintendent of schools may also have to be added in these situations.

The following recommendations and pitfalls should be reviewed prior to establishing a facility planning committee, and they should be incorporated into its operation as the planning process moves forward.

Recommendations

1. The roles, responsibilities, and authority of each person involved in the facilities planning process should be clearly defined and understood. This is applicable also to the subcommittees that are formed.
2. The difference should be clarified between a recommendation and a decision as it relates to the subcommittee activities and the activities of the planning team as a whole.
3. Each participant should be provided with some preparation or training prior to involvement in the facilities planning process.
4. Ground rules, perspectives, priorities, and expectations that are shared and understood by all participants should be established.
5. When participants come together for their first meeting (in any activity, step, or stage of the facilities planning process), time should be allocated to discuss personal views about existing educational problems. This will tend to free their thinking and enable them to concentrate on the facilities planning activity in which they are involved.
6. A climate for the exchange of ideas and the expression of individual feelings and reactions should be established and maintained.
7. Participants should be encouraged to gather information and be honest in their reporting of such information.
8. A number of general team sessions should be planned to acquaint the participants in each of the subcommittees with the activities and progress that other groups are making.

9. When the major work of the committee is completed, members should be thanked and the committee either dissolved or kept abreast of progress through regular reports or meetings.
10. The actions, recommendations, or major decisions made at each meeting should be recorded.
11. The necessary space, materials, and clerical staff needed to permit the committee to function effectively should be provided by the school district.

Possible Pitfalls

1. Premature publicity on facts, discussions, findings, and/or decisions should be avoided.
2. Most individuals will not continue to participate in an activity unless they can understand the potential effect of such participation.
3. A group or committee charged with a particular area of responsibility should be consulted prior to any proposed program or action being taken in this area of concern.
4. Members of each group and the entire planning team should be kept informed; facts, policies, or decisions should not be concealed from them.
5. The effort that the group members put forth and the time and energy they devote to an activity should be respected, along with their recommendations.
6. Failure to allow each participant to express personal views or interests may hamper the planning process.
7. Silent participants should be encouraged to take a position or voice their opinions.
8. Guidance and preparticipation training should be provided so that participants understand their role and can function effectively in the group situations.

The Facility Planning Process

The facility planning process can be divided into seven major stages. It is through the efforts of the team members at each stage in the process that effective programs and facilities for special education students can evolve.

Preliminary Budget Development

Members of the planning committee should provide the needed input as the school district's annual capital budget is being developed. Input at this time is critical, since it will be used to establish the size and/or scope of the project. The information will also assist other individuals who review the capital improvement program to understand what is needed.

Educational Specifications

This document describes the project, its philosophy and programs, facility needs, and other decisions that have implications the architect should consider. It serves as a communication link among educators, the board of education, the architect, and the community.

The responsibility for preparing the educational specifications for a project rests with the planning committee. Through work sessions, discussion, visitations and observations of

existing programs and facilities, reading, and so forth, the team makes decisions about educational programs and activities for the students, teachers, aides, and administrators.

The participants of each subcommittee prepare material for their subgroup and for presentation to the committee as a whole. As these decisions are made, the document nears completion. Usually the chairperson and one or two other committee members take all the subcommittee reports with the reactions of the entire committee to develop the final copy of the educational specifications.

The committee should consider visits to special education facilities that have been identified as having exemplary programs. If possible, the project architect should also participate in this activity and observe students and teachers as they engage in various activities.

The Educational Specifications Format can be used by a planning team to develop educational specifications. (For more detailed information consult *Guide for Planning Educational Facilities*, Council of Educational Facility Planners, International, Columbus OH: CEFPI, 1976, pp. E-4 through E-8). It should be noted that section 4 of the format, *Description of Activity Areas*, contains 17 categories of information. Each educational program, service, and support function should be described using this format.

Educational Specifications Format

1. Project rationale
2. The community
3. Educational plans
 - a. curriculum plan
 - b. instructional method plan
 - c. support plan
4. Description of activity areas
 - a. goals
 - b. planned usage
 - c. number and type of student users
 - d. number and type of staff required
 - e. groupings
 - f. simultaneous groupings
 - g. space requirements
 - h. spatial relationships
 - i. storage
 - j. furniture and equipment
 - k. display
 - l. surfaces
 - m. lighting
 - n. acoustics
 - o. climate
 - p. utilities
 - q. other
5. General building considerations
 - a. health and safety
 - b. economy
 - c. flexibility
 - d. circulation

- e. community use
- f. accessibility
- g. building security
6. Summary of spatial relationships
7. Summary of spatial requirements

Schematics

During this stage of the planning process, the architect should begin translating the printed words in the educational specifications into schematic drawings. At a minimum, this process develops drawings that include a site development plan, building floor plans, and building sections. It is important for the members of the planning team to maintain direct contact with the architect. They should be present at each meeting to assure that the schematics being developed or reviewed reflect what will be needed for the programs that are planned. The educational specifications should be used as the reviewing tool.

The design of an educational facility is an evolutionary process. From four to seven meetings with the architect might be required to develop a schematic design that is acceptable to all members of the planning committee and that reflects the needs as identified in the educational specifications.

Some school districts may secure the services of an outside consultant as a third party reviewer of the educational specifications and schematic drawings.

Design Development and Construction Documents

Two distinctive steps, design development and construction documents, have been combined here for discussion purposes. They involve the architects and their consulting engineers (electrical, mechanical, and structural). The schematic design is refined and construction systems and building support systems are selected.

At these stages, the architects begin to select and place such items as chalkboards, tackboards, electrical outlets, sinks, public address speakers and call-backs, outlets for closed circuit television, built-in furniture and equipment, shelving, projection screens, movable furniture and equipment, types of floor finishes (tiles, carpet), and ceiling treatment.

The planning team and others familiar with the needs of special education students and technical construction details can provide valuable assistance during these stages. The educational specifications should be used again as a reviewing tool. Items specified should be provided in a way that will meet program and user needs. Particular attention should be given to the location and quantity of each item as well as the quality.

Furniture and Equipment

The planning committee members have an important role in furniture and equipment planning. Some of this planning takes place when doing design development drawings and construction documents.

One activity involves working closely with the architect in making the layouts of the furniture and equipment for each space in the facility. It is essential that the specified furniture

FIGURE 2

Planning effective and functional facilities for handicapped students is a lengthy process.

Step	Activity	Step	Activity
1	Identify need for the project	15	Construction documents approved
2	Prepare Capital Improvement Program for planning funds	16	Advertise construction contract
3	Obtain approval and funding for planning	17	Analyze construction bid—including built-in furniture and/or equipment
4	Establish the facility planning committee	18	Award construction contract
5	Select and appoint the project architect	19	Construction
6	Prepare educational specification for the project	20	Advertise furniture and equipment contracts
7	Educational specification approved	21	Analyze furniture and equipment bids
8	Architect prepares schematic drawings	22	Award furniture and equipment contracts
9	Schematics approved	23	Monitor construction progress and furniture and equipment contracts
10	Architect prepares design development documents	24	Make final check of construction project and movable furniture and equipment
11	Design development documents approved	25	Open school
12	Obtain approval and funding for movable furniture and equipment	26	In-service and orientation program
13	Architect prepares construction documents	27	Evaluation by users
14	Architect and/or district prepares furniture and equipment list and layouts	28	Feedback
		29	Implement recommended changes to accommodate the educational program

and equipment be functionally placed, allowing space for students and the planned activities.

Another major activity involves the actual selection of items to be specified or purchased. Information about different products should be obtained from catalogues, salespersons, sales brochures, and discussions with personnel. Detailed criteria should be established for each item to be selected. Particular attention should be given to the specific needs of handicapped students.

If competitive bidding is required, performance specifications should be developed. It is essential that they be used as the criteria for evaluating each bid prior to the award of contract.

The furniture and equipment needs of handicapped individuals are often specialized. When standard commercial products are not available, it may be possible to find a local cabinet maker or furniture company to produce some of the necessary specialized pieces.

Some requirements will not be identified until the building is occupied and the program functioning. Requirements may also change over time. In addition, funding and facilities may

be required to provide for the design and construction of specialized or modified furniture and equipment within the school district or individual school building. For these reasons, the furniture and equipment budget for the school program may have to take into consideration an ongoing need for furniture and equipment.

Orientation and Inservice Programs

The planning committee should develop orientation and inservice programs for school staff, students, parents, and the community. This could be a workshop, training institute, or seminar held prior to the opening of the new or renovated facility, and an ongoing program throughout the school year. This is particularly important for those who have not worked with or been exposed to the handicapped population that will be served.

Evaluation

The evaluation stage of the planning process is a continuous activity. Although a formal evaluation of the special education

areas may be carried out at any point after occupancy, it is recommended that the evaluation be done between the sixth and tenth month after occupancy. It is important to schedule a reevaluation of the special education facilities because of the diverse and rapidly changing needs of the students being served, the changes in educational organization and methods to meet their needs, and the changing handicapped populations entering the public school setting.

The educational specifications should be a guide by which each facility is evaluated. Current programs operating in the facility should also be considered.

Input from the planning committee members who were involved from the early stages of the planning process would be most helpful for future school projects. They could identify features to be repeated, others to be eliminated, and others that require further study and modification. Their suggestions could also affect the planning process to help develop better facilities.

In some situations the district may initiate action to make changes in the facility that has been evaluated. This is particularly important for these facilities which provide educa-

tional programs and services to handicapped students. The factors previously cited that relate to the needs of the students and the method of delivering the programs and services suggest that this is an essential element for which funds are required. If the school district does not have the staff qualified to carry out this function, assistance may be obtained from the state department of education or from a qualified outside consultant. Funds should be budgeted prior to the time they are needed.

For assistance in selecting or obtaining an educational facility evaluation instrument, the state department of education or the Council of Educational Facility Planners, International, may be contacted.

Planning effective and functional educational facilities for handicapped students is a long process. When carried out well, it can be immensely fulfilling and can result in facilities that enhance and support the programs and services envisioned for students, teachers, aides, administrators, and other support staff. Steps in the planning and construction process are summarized in Figure 2. These steps are not necessarily linear and some could take place simultaneously.

CHAPTER 3

Design Guidelines

HOW TO USE INFORMATION IN THIS CHAPTER

Across the country there exists a variety of personnel, programs, and services provided for handicapped students. Teaching methods, techniques, and procedures vary considerably. It follows that the support facilities also should not be unnecessarily standardized. For this reason, the design criteria in this chapter should be viewed as a basis from which to begin planning rather than as the end of the problem solving process. The design criteria can be used to define topics that need addressing, identify questions that require answers, and suggest alternative solutions. The criteria presented are those which could be stated primarily as a result of the project's research data, with some additional criteria developed from other reliable sources. It should not be assumed that because an idea or concept is not included in this chapter it does not deserve consideration.

The design criteria in this chapter can be retrieved primarily in two ways:

1. By special education service (e.g., Physical Therapy or Art). To gather design criteria by a specific special education service, one should combine the information found in section 1 (General Building Design Criteria) with the information found under that service in section 2 (Design Criteria By Special Education Service).
2. By environmental variable (e.g., Space or Lighting). To gather design criteria by a specific environmental variable, one should combine the information for that environmental variable found in section 1 (General Building Design Criteria) and under that environmental variable for each special education service found in section 2 (Design Criteria By Special Education Service).

If the reader wants to obtain information to provide services for a specific exceptionality, for example, orthopedically handicapped or visually impaired, he or she should first read all of section 1. Then the services required should be identified and referred to in section 2.

As stated in the Preface, this guide intentionally avoids using the categories traditionally applied to students receiving special education services as the primary basis for organizing the design guidelines in this chapter. This parallels one emphasis of Public Law 94-142 requiring an individualized education program for every handicapped child.

In a few instances, this chapter does relate design criteria to the categories of handicapped students as defined in Public Law 94-142. This occurs for the most part in one service area, the general instructional area. It is important to emphasize the reason for having any information in this document organized in this manner.

The postoccupancy method of collecting data involves the evaluation of *existing* facilities and programmatic conditions. Although a movement away from categorization is afoot, many teacher education programs are still using specific disabilities as a basis for training. In addition, federal financial aid based on disability statistics continues to reinforce categorization.

The definition and objectives presented for each service in section 2 can serve as a guide for practices within school systems. Specific objectives are determined by state laws, rules and regulations, school policies and procedures, the populations being served, and the availability of resources.

In section 2, worksheets have been developed for each special education service for determining space requirements. The suggested figures in the worksheets are based on careful analysis of teacher evaluations and researcher observations of space in the schools visited. These worksheets should be related specifically to a particular program and accompanied by a good participatory planning process. The activities in the worksheet may not be all-inclusive. On the other hand, a particular activity included in the worksheet may not be anticipated to occur in a specific program. Working from a definitive description of a program (e.g., goals and objectives, type and number of participants, grouping, activities) the planner should use the worksheet as a basis for planning.

The worksheets often include the statement "a minimum of X square feet." The term *minimum* is defined here as the least amount of space required to carry on the very basic function for a particular activity. Some programs may require space in addition to the stated minimum.

It should be noted that when space is suggested for a particular special education service and its related activities, it is assumed that a commitment has been made for providing the necessary staffing, materials, supplies, and equipment. If the staffing pattern does not justify a distinct space for a particular service, the sharing of space between services should be considered. Two services such as physical therapy and adaptive physical education, for example, may be staffed with

part time professionals equivalent to one or two days per week for each program. These activities could share a single space until such time as the staffing increased and additional facilities could be justified. At the same time, it is important not to make the mistake of providing this type of shared facility when staffing is expected to be increased within the next several years. Not providing facilities for each of the services in this situation would be shortsighted and false economy.

The lists of typical activities, furniture, and equipment given for each service in section 2 are not intended to be all-inclusive and are not intended as model lists for a program. They are presented to provide representative examples of activities, furniture, or equipment that frequently occur or are used in some programs. They can serve as a guide to individuals planning facilities for special education services. These lists should be considered as a jumping-off point for developing lists for any specific program. The lists can also serve as introductory information to those persons not familiar with a particular service.

DEFINITION OF TERMS

The following terms are used throughout this chapter and are defined here for clarification:

1. *Direct access*: The capability of circulating from one activity area directly to another activity area.

2. *Indirect access*: Having to pass through at least one additional space when circulating from one activity area to another activity area.
3. *Conveniently located or convenient access*: Within the same general portion of the building.
4. *Acoustical isolation*: A space that can be acoustically separated from its adjacent spaces by means of enclosure.
5. *Open shelving*: Built in or movable shelving or bookcases that cannot be secured.
6. *Counter surface*: Horizontal surface that can be used for work area, display, or storage and is in addition to those surfaces created by the tops of movable furniture. This surface is often associated with a sink.
7. *Closed storage*: A built in or movable cabinet that can be secured.
8. *Storage room*: An enclosed space with built in shelving that can be secured.
9. *General instructional area*: One or more spaces in which preschool, elementary, and secondary students usually spend the majority of the day; space analogous to what is often referred to as the general classroom or home room.

Section 1: General Building Design Criteria

Educational facilities for special education programs should provide a challenging but supportive environment. The design of these facilities should accomplish two objectives simultaneously: (a) The physical environment should support the handicapped student's learning by avoiding unnecessary confusion, safety hazards, physical barriers, and so forth; (b) the physical environment should aid the handicapped student in learning to function as normally as possible by presenting opportunities to be challenged by the environment.

Attempting to meet both of these objectives is often difficult. At times, these goals may appear to be in conflict. The building should provide a supportive environment in which the child is not overprotected. The school environment should present experiences that the student may encounter and have to cope with outside the school setting. The key is not to impose these experiences arbitrarily but to allow the professional staff discretion in their use. The school building may include various types of sink controls, door hardware, or light controls in carefully selected locations as instructional tools. Where mobility training is an important activity, the building may provide opportunities to experience a broad range of floor surfaces and other conditions.

ACCESSIBILITY

In addition to using the criteria listed, the most recent American National Standards Institute's *Specifications For Making Buildings Accessible To and Useable By the Physically*

Handicapped (A117.1) should be examined. A new comprehensive standard was near completion at the time of this writing. This standard has been based on research conducted with adults only. Some of the suggested locations of hardware, dimensions of materials, and so forth may have to be re-evaluated for school age children. Three of the following criteria were adapted from American Society of Landscape Architects Foundation, 1976.

- ☐ **Accessibility** (defined here as gaining entrance to, and exiting from a building) should be provided for all people through similar means. This can be achieved with very few exceptions, thus enhancing convenience and safety for all people.
- ☐ **Visual and physical separation** between pedestrian walks, bus circulation, car circulation, and parking should be provided (see Figure 1).

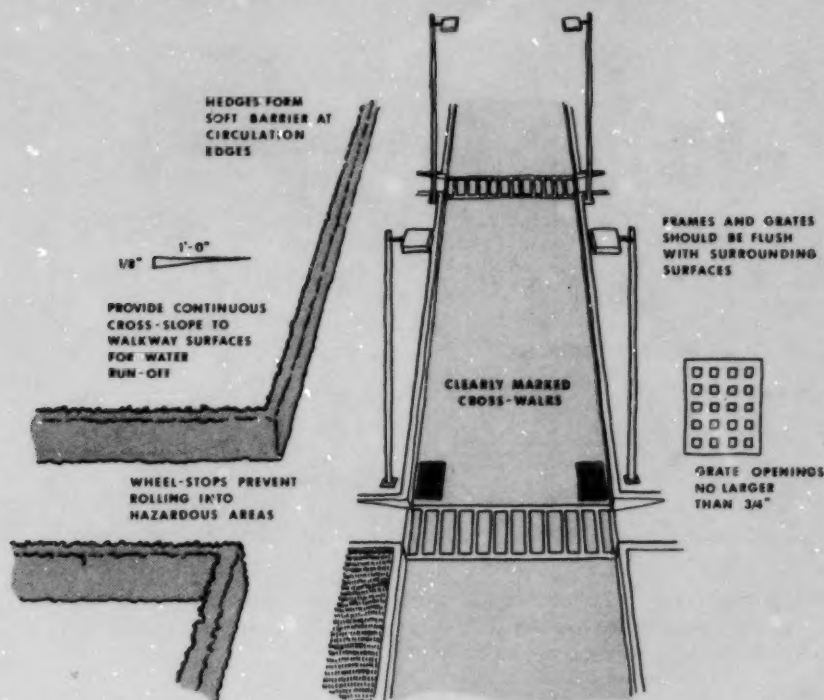
Safety problems are often increased with handicapped students.

These different traffic patterns can be distinguished by the use of curbs, landscaping, and/or other acceptable techniques.

- ☐ **Walkways** should allow people to move safely and independently.

FIGURE 1

Accessibility includes consideration of vehicle/pedestrian separation, drainage, and surface features.



Adequate width for walkways should be provided:

One way traffic: 4 feet, 0 inches minimum

Two way traffic: 5 feet, 6 inches minimum

Surfaces should be relatively smooth, nonslip, and joints kept to a minimum.

A continuous cross slope should be provided to assure proper water runoff and avoid ice buildup in cold climates (Figure 1).

Frames and grates should be kept flush with the adjacent area (Figure 1).

Grates should not have openings larger than 3/4 inch (Figure 1).

Drainage structures should be located so as not to build up surface water, especially in areas such as curb ramps.

Curb ramps should be used to negotiate the change in grade between walkway and street.

- ☐ **Outdoor lighting should provide a safe and secure means of travel during dark hours.**

Lighting should be provided in heavily traveled areas and areas that would be dangerous if unlit, such as stairs, ramps, intersections, and abrupt changes in grade.

Posts and standards should be situated so as not to present a hazard.

- ☐ **Outdoor plantings should facilitate the safe and efficient flow of pedestrian traffic (Figure 1).**

Plant material can be helpful in providing protection from the wind.

Plantings that may prevent the effective melting of ice or snow on walkways should be avoided.

Plantings with shallow root systems should be used only where they will not damage walkways, causing pedestrians to trip and fall.

Avoid plantings that may drop excessive debris on walkways, bike paths, and other travel areas.

Plantings with large thorns should not be placed next to walkways or sitting areas.

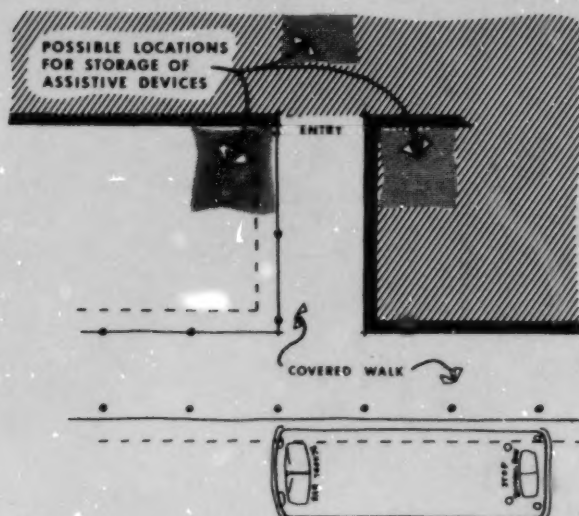
- ☐ **Where adaptive and assistive devices are prevalent, storage space should be considered in the entry area serving the bus loading and unloading activity (see Figure 2).**

Storage for wheelchairs, carts, walkers, and other devices is often necessary. When storage is not provided, serious congestion may occur in the entryway.

- ☐ **A gathering space within the building should be provided to accommodate students waiting for or arriving from buses.**

FIGURE 2

The entry may require storage space for assistive devices.



Bus scheduling for handicapped students can often involve a more complex and lengthier time schedule. Waiting becomes a more important activity requiring space, supervision, and organization.

An interior space is required to aid in supervision and safety and for periods of inclement weather.

- ☐ In climates with considerable snow and/or ice accumulation, heating elements in the walkway should be considered in addition to covering the walkway.
- ☐ The distance between the bus drop-off/pick-up area and the building entrance should be kept to a minimum.
- ☐ A covered entrance area is essential in all climates except those that are very dry. The canopy should extend over the curb and be high enough to shelter the doors to buses and other vehicles (Figure 3).

SPACE AND SPATIAL RELATIONSHIPS

- ☐ The building design should strive for compactness (Figure 4).

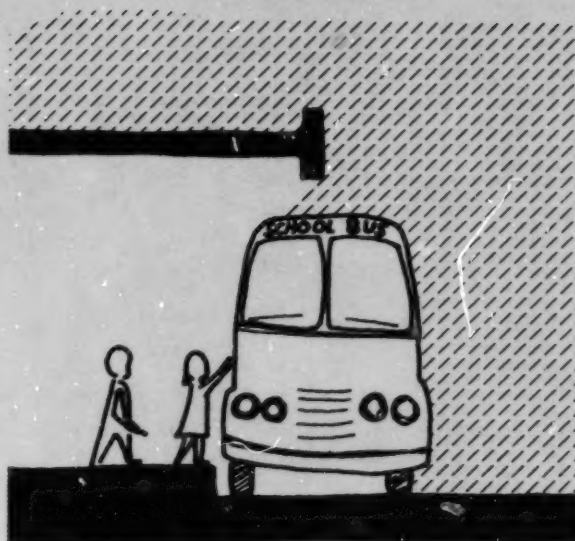
The time spent getting from one location to another may be significantly increased with some handicapped populations. Although traveling through the school can be a learning activity in itself, circulating should not take an exorbitant amount of time away from basic learning activities.

Compactness will aid the visually impaired student in striving for independence in moving about the building.

Excess distances may contribute to creating "islands" within a school. Communication between staff and stu-

FIGURE 3

The entry should be covered.



dents is extremely important for the integration of staff, students, and activities. Proximity is a factor in achieving this goal.

- ☐ The building should give the student a clear sense of orientation. The student should know where he or she is in the building at any given time.

Several methods can be used to accomplish orientation. A simple geometric floor plan is useful, such as a square or rectangle. Circular floor plans and corridors, when com-

FIGURE 4

The building design should strive for compactness.

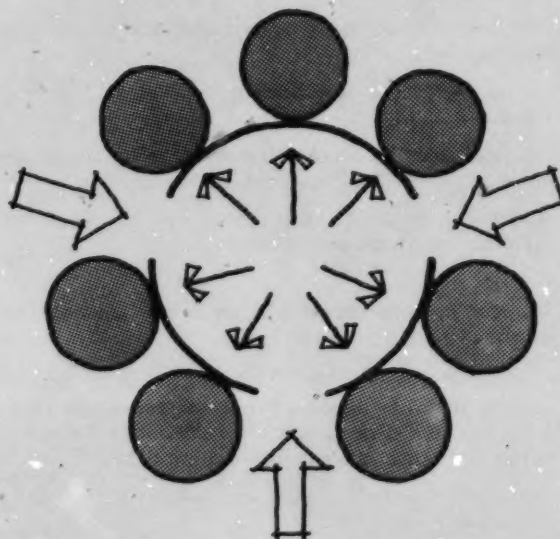
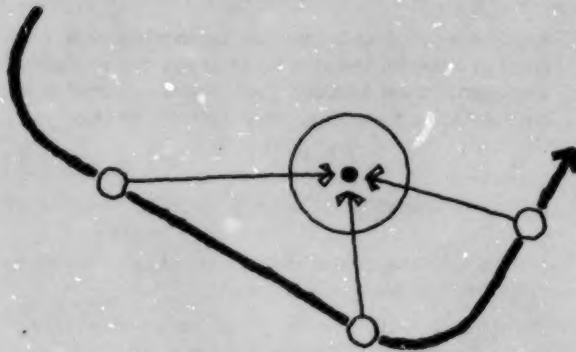


FIGURE 5

Views to a common element can provide orientation.



bined with other geometrics, can be confusing. Courtyards are useful in providing orientation, as are two story atrium spaces. Views to a common element, such as a courtyard, from different points of the building can aid in orientation (Figure 5).

The use of color and/or texture can aid in orientation (Figure 6).

- Building layout should carefully consider age groupings.

The introduction of handicapped students into the general school can significantly increase the age range of students being served. This may require the clear architectural separation of one large group of students from another in order to control the interaction of younger students with older students (Figure 7).

FIGURE 6

Using color coded lines in corridors is one technique for aiding orientation.

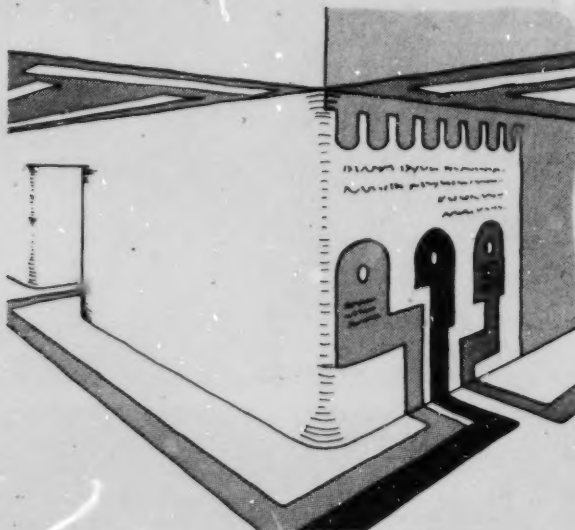
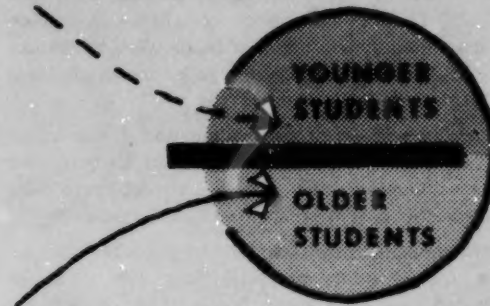


FIGURE 7

Separation by age grouping may be desirable in the building layout.



- The building should facilitate coordination and cooperation among administrators, staff, and volunteers.

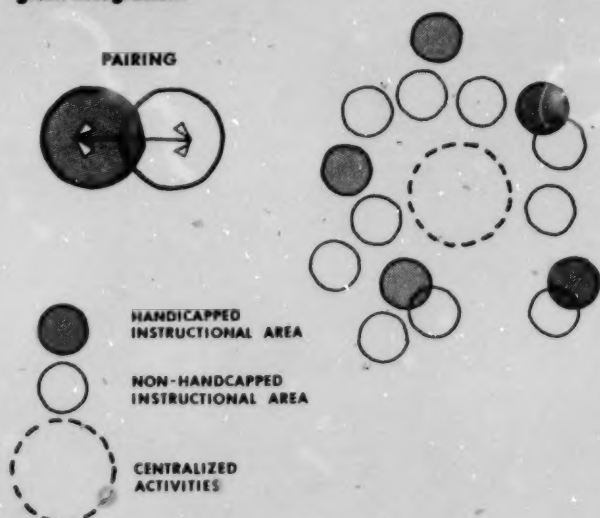
Coordination and cooperation is critical to a successful program. The absence of coordination and cooperation is often a major obstacle to the integration of regular and special education services.

Having a single administrative leader for the school is found to be far superior to having a principal for the regular school and a separate principal for special education programs. It follows that a central administrative office for all programs of the school is most desirable.

When classrooms that primarily serve handicapped students exist, the technique of pairing one of these classrooms with one serving nonhandicapped students should be considered for the integration of students, teachers, and services (Figure 8). This design concept provides opportunities for partial or total integration as well as total separation.

FIGURE 8

Pairing instructional areas serving handicapped and non-handicapped students can provide opportunities for program integration.



All special education services should not be clustered into a single location. Clustering does not promote the integration of special and general education students, teachers, and services. Although some special education services must be located adjacent or in proximity to each other, special education services (particularly classroom areas) should be physically integrated throughout the school as much as possible (Figure 8).

Derogatory labeling of some students by their peers can be a problem in any school setting. Labeling may occur if special education services are placed in a wing, in an adjacent building, or in other isolated locations.

General education staff can form negative attitudes toward special education staff. This can often be attributed to lack of interaction with and knowledge about special education staff and services. The problem can be minimized by (a) physically integrating general education and special education services; (b) providing lounges, dining, and similar facilities that encourage interaction between professionals; and (c) integrating teacher planning space for both staffs.

- ☐ Whenever possible, it is preferable to provide one location or as few as possible for staff activities such as lounging, dining, and teacher planning.

Arbitrary separation of staff by grade level, special versus general education, or training (e.g., speech therapist versus classroom teacher) may inhibit professional interaction and help to create unwanted attitudes.

- ☐ Classrooms in particular, and all instruction areas in general, should be placed to avoid intrusion from outside noises such as those caused by playgrounds and roadways. (Figure 9).

Excessive noise can be a significant factor in distracting a student from a specific task and encouraging disruptive behavior.

- ☐ Specific service areas should be located near each other to allow for the sharing of space and equipment and coordination between staff, and to aid staff members providing services to more than one program.

Classrooms can often share specialized equipment, toilet rooms, storage space, observation space, and staff (Figure 10).

Art, industrial arts, prevocational, and sheltered workshop programs can benefit from proximity.

Objectives and activities for occupational therapy, physical therapy, adaptive physical education, and/or perceptual motor training often overlap. Staff interaction is desirable since these programs use some of the same or similar types of specialized equipment.

- ☐ Space should be provided for all staff to meet, socialize, relax, and to store personal items.

A space for staff that accommodates these activities can have a positive effect on the behavior of education personnel. Special education staff have an unusual number of demands placed on them primarily due to the highly individualized nature of the program, often including health and hygiene activities; the cooperation and coordination required between staff members; frequent observation by visitors, student teachers, and parents; and frequent parent contact for conferences and/or training.

- ☐ Space may be required for parents to meet, socialize, and relax.

FIGURE 9

Instructional areas should be located to avoid outside noises.

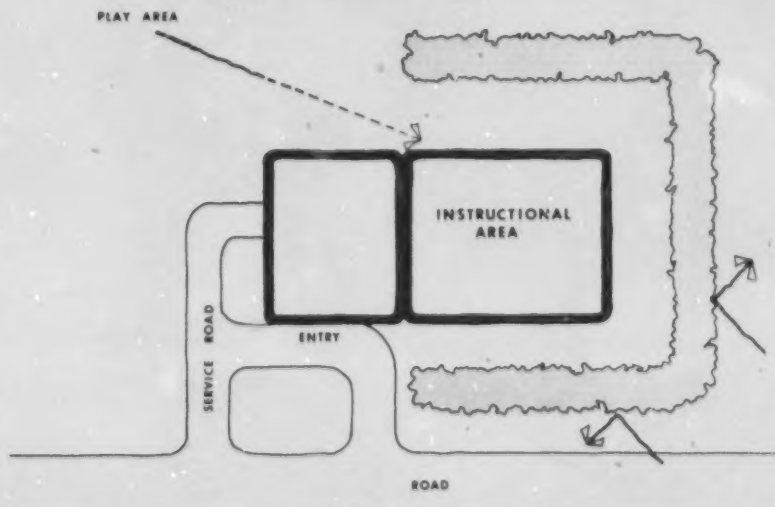
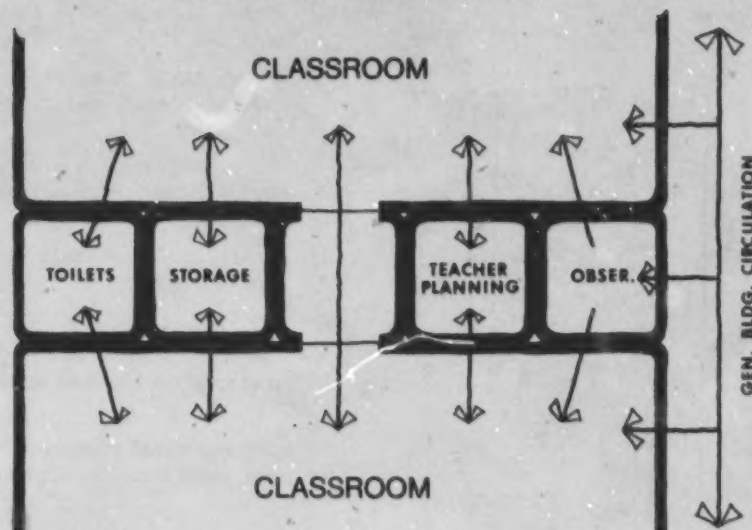


FIGURE 10
Classrooms can often share specific support spaces.



The philosophy and laws applying to special education have parent involvement as an integral part of the program. Parents may spend a substantial amount of time in the school to observe, be trained, serve as volunteers, and be involved in the diagnosis and evaluation of their children.

STORAGE

Anticipating future storage needs can be difficult; yet it must be done, for inadequate storage can hamper the instructional program. During initial planning, enough space should be set aside to accommodate both present and future storage needs. Once such space has been provided, flexibility in using that storage space becomes important.

- ☐ The design of storage must respond to the needs of the educational program.

Many instructional materials and most equipment need to be put out of sight when not in use to eliminate distractions.

Prepared instructional materials often need to be kept out of sight until ready for use within the instructional area.

The storage of large bulky items of equipment is a frequent need.

Individual student storage is a common need. This can be for personal items (coats, boots), learning materials, project materials, or tote trays. This storage may be open or enclosed depending upon the student population. Certain populations such as emotionally disturbed or severely handicapped students could require closed storage to minimize distractions.

- ☐ Storage provided should be located in proximity to where items are to be used.

A storage room containing a variety of storage types

should be adjacent to the instructional area.

Closed cabinets above counters are well located for locked storage.

Space adjacent to the entry to the classroom can be useful for personal storage needs of students.

If the instructional area has direct access to an outdoor area, a storage room for outdoor equipment may be needed.

- ☐ Storage should be flexible and adjustable so as to accommodate unforeseen changes.

Shelves should be vertically adjustable.

An enclosed storage room is one option for a classroom anticipating changing future storage needs. Its size is highly dependent upon the population being served and the specific storage needs.

Possibility for shared storage spaces should be investigated to maximize storage potential. Spaces might be shared by special education services or by two classrooms.

- ☐ The type of storage provided should accommodate the size, number, and characteristics of items to be stored.

A wide variety of storage means and types can be provided, including open shelving, closed cabinets, closets, file cabinets, counters, and glass enclosed cases. Shelving can be located high or low on the wall, can vary in depth from 8 inches to 3 feet, can vary in vertical spacing, and be slanted or flat. Storage can be closed with sliding or swinging doors that are locked or unlocked.

- ☐ Storage provided should be accessible to and usable by teachers, staff, and, as required, by students.

FIGURE 11

An area for removing outer garments may be appropriate in the student locker area.



Low open shelving and cabinets are more desirable for student access.

For security, some storage should be out of reach of students and equipped with locks.

Doors that slide to enclose storage are safer than hinged doors that can protrude into circulation paths and cause injury.

Certain cabinets and shelves should be at a level accessible to nonambulatory students. There should be suffi-

cient surrounding floor area for maneuverability of all students.

Overhead storage for student retrieval can be dangerous, especially if students must stand on something to reach it.

Folding closet doors are a problem to operate because they break easily and are difficult for some students to maneuver.

Some storage should be accessible to wheelchair bound students, with required knee space and appropriate height.

An area for removing outer garments may be appropriate in a student locker area (Figure 11).

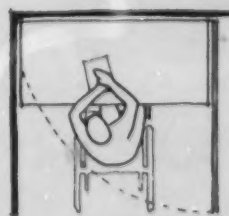
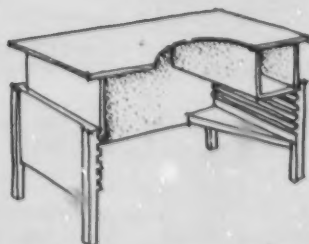
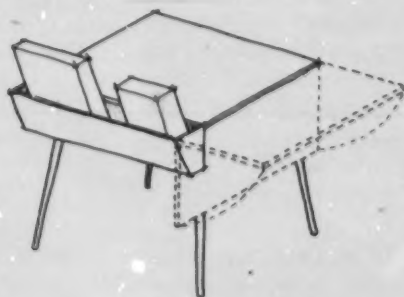
- ☐ Outdoor storage should be provided for play equipment and other outdoor instructional items.
- ☐ Storage should provide for the personal items of teachers, aides, specialists, parents, and volunteers.

FURNITURE AND EQUIPMENT

Design criteria for furniture and equipment to be used by handicapped individuals are equally applicable to the design of furniture and equipment for nonhandicapped persons. The only difference is the degree to which one can deviate from the criteria. While the average individual can usually adapt to compromises, the handicapped person may be dependent on strict adherence to careful design requirements. Therefore, the design characteristics that are desirable for the average person may be essential for the handicapped person. The safety of the user and the success of the school as a func-

FIGURE 12

This is a sample of the diverse types of furniture and equipment often necessary to meet student needs.



tional environment are at stake. The following list of criteria is intended as a basic checklist with which to evaluate and compare products.

- ☐ Furniture and equipment should support individual needs of students and teachers (Figure 12).

- ☐ Furniture and equipment should be curvilinear and which can create an obvious safety hazard to the user.

The legs of a chair, for example, should not protrude beyond the outermost vertical plane of the chair (Figure 13).

- ☐ Furniture and equipment should be curvilinear and have materials that are relatively resilient.

These curvilinear and resilient features are compatible with the human body.

This design approach will maximize comfort and minimize injury.

Furniture should not have edges that are sharp or composed of or covered with a nonresilient material.

- ☐ Furniture and equipment should be viewed as objects that potentially give support to people.

Furniture should be sufficiently stable to offer support.

A chair should support the user. In addition, a chair back should be of sufficient height, strength, and shape to encourage its use as a railing, as needed (Figure 14).

- ☐ The elements in the design of a piece of furniture (the arms, legs, back, and seat of a chair), between objects (a table and a chair), or between an object and its background (a chair and the wall it is placed next to) should be easily distinguishable. Objects intended to give support should be easily perceived. For example, the arms of a chair should be distinguishable from other elements of that chair and easily identified against the background surfaces of the wall and floor.

Handicapped individuals in many cases have difficulty interpreting their physical environment due to a physical, emotional, or visual problem.

Environmental clarity which prevents confusion and injury can be achieved by a variety of techniques such as using color and/or texture to create contrast and allowing spaces between important elements of an object, such as the arm and seat of a chair.

- ☐ Furniture and equipment should be safe and provide a feeling of security.

FIGURE 13

The legs of a chair should not protrude beyond the outermost vertical plane.

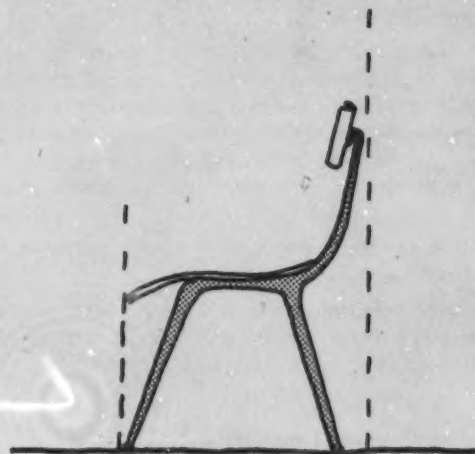


FIGURE 14

Furniture design should incorporate stability and the chair back encourage its use as a railing.



Objects and materials should not appear to be something other than what they are. Materials, for example, that indicate strength or hardness should in fact be strong and dense. Materials that simulate wood, metal, or cloth should be avoided. Storage cabinets should not have false drawers and hardware.

The repetition of furniture layouts should be avoided where it will contribute to the confusion of the building user. An individual's sense of orientation can be distorted by an environment that has identical, repetitive elements in space. Furnishings can be useful in providing an orientation in the environment by introducing variation in color, texture, form, and space definition.

Finishes with high reflectance should be avoided. High reflectance may create confusion.

The design of furniture should maintain structural integrity and should appear secure and stable to the user. For example, objects should not appear to defy gravity.

☐ **Seating should be functional and comfortable.**

Extremely hard seats can excessively compress the flesh.

Excessive padding can increase pressure around the peripheral edges of the body and increase the difficulty of sitting down and rising up.

Seats should afford sufficient friction to help one avoid slipping.

☐ **Furniture and equipment should have nonglare surfaces.**

Nonglare surfaces reduce eye fatigue and distractions.

Matte finishes should be specified.

☐ **Furniture and equipment should be resistant to staining, scratching, and chipping.**

Toileting accidents may occur frequently with some handicapped populations.

Use of such items as wheelchairs, braces, walkers, canes, carts, cycles, and roller boards increases the opportunity for damage.

Cooking activities are prevalent in special education programs.

DISPLAY

The provision for display is very important to the success of every instruction area. Since display is something that many teachers use frequently in the daily routine, a range of options should be available in location and quantity. All walls in a classroom should have some display option. Moreover, all areas of the wall not used for other purposes should be available for display.

☐ **Types of display provided should accommodate the size, number, and characteristics of the items to be displayed.**

Chalk surfaces can be portable or fixed but should be in contrasting color with the chalk.

Portable chalk surfaces are a flexible option in addition to fixed surfaces.

Magnetic chalk surfaces can double as display surfaces for magnetic objects.

Chalk surfaces that slide vertically on tracks can be used by students and staff of different heights.

Tack surfaces can be portable or fixed and on tracks to slide vertically for the same reasons as chalk surfaces.

Many items displayed will be three dimensional. Glass enclosed cases are often needed.

A viewing screen is usually required in most instructional spaces and can be permanent or portable, roll down or always in place, or simply a light colored wall. The criteria for selection are the frequency of use and the kind of visual images to be displayed (e.g., slides, filmstrips, movies):

A floor length mirror can be useful in giving a student feedback of his or her body image.

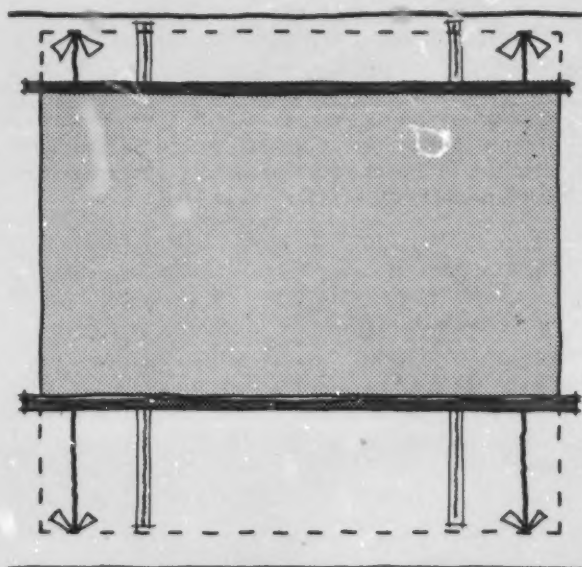
A map or chart rail or holder is needed in some classrooms.

Pegboard and feltboard, whether portable or fixed, are useful display options.

The magnetic properties of metal partitions provide effective display surfaces.

FIGURE 15

Display surfaces should be adjustable in height.



- The display means, location, and distribution should be flexible enough to accommodate changing display needs.

The nature of changing special education programs and the high variability in student populations make flexibility important.

To achieve high flexibility, all or most wall surfaces should be covered with alternate areas of chalk and tack surface.

Additional flexibility can be achieved by having the tack surface slide over the chalk surface on rails.

Height of display should relate to the child's height whether he or she is on the floor, in a chair, or standing up. Display surfaces should also be adjustable to the teacher's height (Figure 15).

For certain populations, tackboard may have to be placed out of student reach but within visual range.

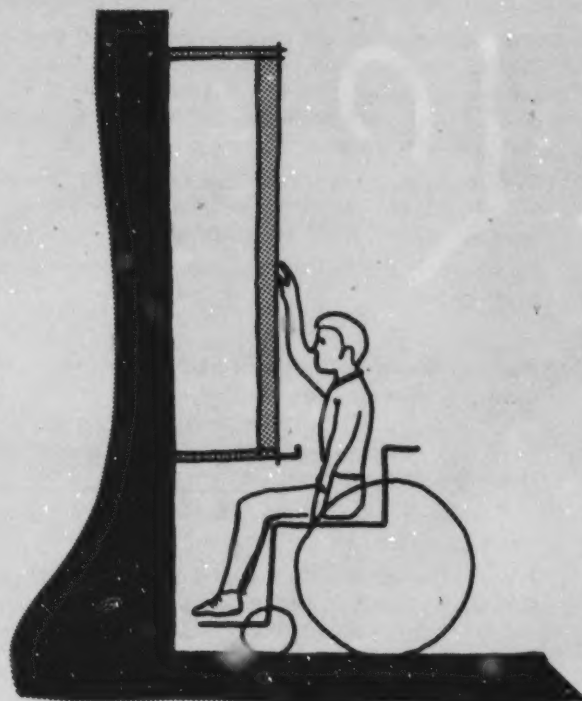
Tack areas can be functional up to the ceiling for permanent display.

Tack strip should be placed around as much of the room perimeter as possible to maximize the flexibility of use.

Certain chalk and tack surfaces should be cantilevered from the wall at a height accessible to the student in a wheelchair (Figure 16).

FIGURE 16

Cantilevered surfaces are accessible to students in wheelchairs.



SURFACES

The surfaces of a space not only define and identify it, but also can be attractive in appearance and useful for display. Surfaces have acoustic properties. They can be hazardous to the touch or comforting. They can be easily cleaned and maintained or easily damaged and quickly deteriorating. Many surface treatments in instructional spaces have become a matter of convention. Inventiveness and creativity are needed to resolve the many criteria which surfaces must satisfy. (Properties of surfaces are also discussed under Display and Acoustics.)

Students come into contact with the surfaces of a space most often. Orthopedically handicapped students may inadvertently contact a surface; be injured by it; or damage it with braces, wheelchairs, or other devices. Students with behavior problems or seizures may contact surfaces through violent or destructive actions. Thus, the choice of surface materials is critical for handicapped students.

- Surfaces should not be harmful to the students upon contact or during use.

Certain handicapped students have difficulty in movement and are more prone to falls. Special attention should be given to floor surfaces in high use areas such as building entrances and corridors, around drinking fountains, ramps, and stairwells. Rough textured floors should generally be avoided. Many floor surfaces can be slippery when dry and more so when wet. This is particularly dangerous in toilet rooms where falls can cause injury.

Protrusions from walls should be avoided for safety reasons, particularly in traffic areas. Common protrusions are hardware items, plumbing fixtures, doors, cabinets, shelves, and various equipment.

Rough texture walls (rough brick, concrete) can cause scratches and scrapes. Emotionally disturbed students and others susceptible to behavior problems or seizures are likely to have injurious contact with these walls.

Special consideration should be given to the design of corners. Wall corners should be rounded for safety, especially at entrances and exits. This can avoid injury when students come into contact with corners. Color and/or texture can be useful on walls to place a corner in contrast with its background (Figure 17).

Hard floor surfaces such as terrazzo and quarry tile can present hazards for students prone to falls due to seizures, acting out, or mobility problems.

Soft floor surfaces can avoid injury from falls.

Carpets should have low pile to facilitate wheelchair movement. They should also be laid securely to avoid tripping, especially for those individuals with mobility difficulty.

Thresholds and other transitions between floor surface materials should not present hazards to students, especially those with visual or physical impairments. A maximum height change of 1/2 inch is acceptable in many situations; however, flush transitions are more desirable at doorways and other locations requiring complex movement.

- **Maintenance and cleaning should not require special measures, and the surfaces should not deteriorate in the process.**

Wall surfaces should be easily cleaned of dirt, grease, paint, crayon, and other soil. Cooking and other domestic activities take place frequently in special education programs. Students with behavior problems and/or emotional disturbances may mark or otherwise affect the walls.

Carpeted floors present some maintenance problems due to potential ripping, staining, food spills, and toileting accidents. A low pile, tightly woven carpet should be selected.

Carpet should not be used in wet areas because it does not dry rapidly.

- **Surfaces should resist damage from normal use and, if damaged, be easy to repair.**

Wood door frames are easily damaged, and the presence of splinters is a potential hazard.

Gypsumboard walls are vulnerable to damage by denting, breaking, or the surface peeling off.

A suspended acoustic tile type of ceiling is vulnerable to damage because the panels are easily removed and quick to break. This can be a particular problem with secondary level emotionally disturbed students.

- **Room surfaces should lend themselves to the use required by the instructional program.**

There is a need in many spaces to hang and attach equipment and devices to the ceiling or wall structure (Figure 18). This need must be anticipated in designing the ceiling in certain spaces such as physical therapy and physical

education areas because the equipment is sometimes heavy. This equipment may need to be attached to the building structure. Where minimal weight items are to be suspended, the ceiling surface or suspension means might be used.

There is a need in many spaces for the ceiling to have the capability of displaying instructional materials, student work, and other objects.

A change in floor surface gives all students, especially the visually impaired student, a sense of location in a room.

If there is a requirement for staff and student comfort during activities on the floor, then carpet or another material should provide a cushioning.

- **All wall surfaces in instructional areas should function as display surfaces to the maximum extent possible.**

Walls that function as a display surface in their entirety are preferable to display boards (tack or chalk) mounted on walls (Figure 19). This provides increased flexibility and enhances acoustic characteristics.

Wood walls are useful as display surfaces. However, vertical lines (joints) may be visually disturbing to certain students having visual impairments, and lower portions of the wall are easily damaged.

- **The appearance of the room surfaces should be dependent upon the instructional program.**

Walls without patterns or bright colors are the most useful and pleasant. They form a neutral background and provide more flexibility for display and educational activities.

The ability to change wall colors is important to the flexible

FIGURE 17

Special consideration should be given to the design of corners.

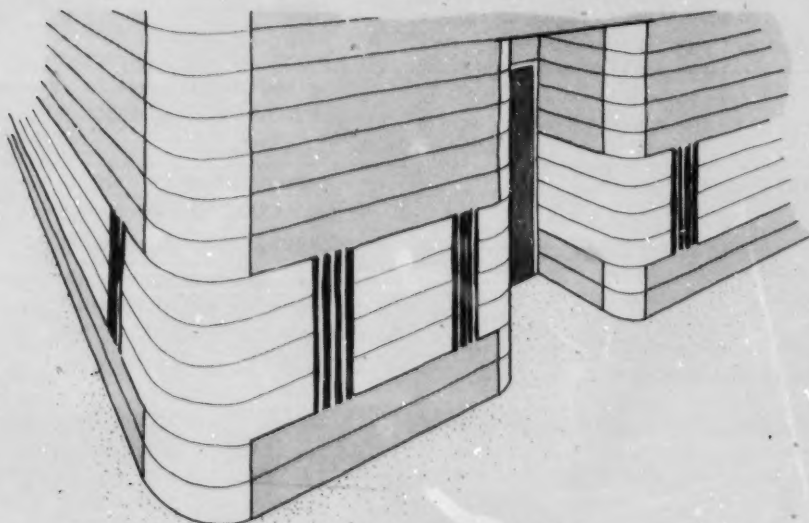
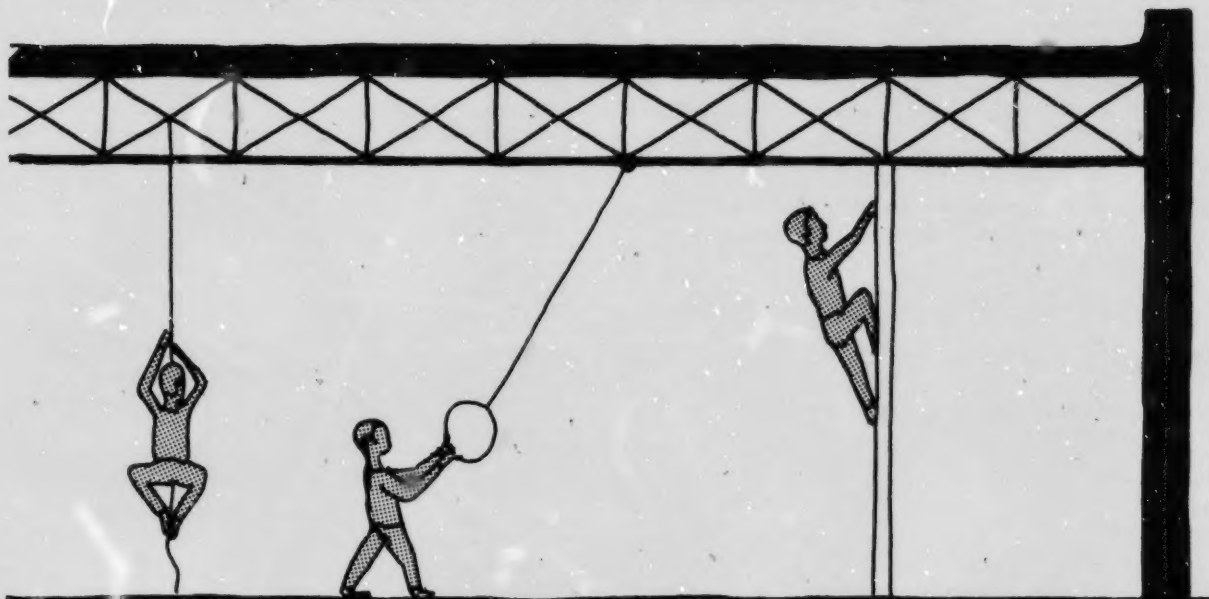


FIGURE 18

Ceilings may be required to support various types of equipment.



use of a room. Room colors will require changing more frequently in special education programs. As student populations change so does room use; therefore, permanent and/or bright colors are undesirable.

Walls should have a noninstitutional appearance in material and color. A noninstitutional appearance makes transitions from home to school easier for young students. It may also have a positive educational influence on handicapped students.

LIGHTING

Since many educational activities are visual in nature, lighting cannot be emphasized enough as an area of importance. Research data on one lighting type versus another (e.g., fluorescent versus incandescent) are available but not conclusive. The only sound approach is one of flexibility and adherence to basic principles. The ultimate lighting criterion is to recognize that educating some handicapped children dictates individualized educational services and therefore requires a wide range of instructional equipment, materials, and teaching methods. Lighting as an environmental variable must, in turn, provide a wide range of options that can be quickly called upon by the professional staff.

- ☐ Uniform glare-free lighting is highly desirable to allow flexible usage of the educational space.

In the vast majority of instructional areas, standard fluorescent overhead light fixtures are appropriate because of the uniform diffused light they provide throughout the space. Incandescent direct lighting can produce nonuniform light-

ing levels, glare, and shadows. Uniform glare-free lighting is particularly important for partially sighted students and for lipreading for the hearing impaired.

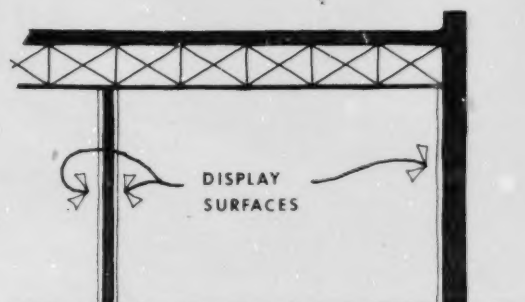
- ☐ Room light fixtures should not cause hyperactivity or initiate seizures.

This may be caused by fluorescent fixtures due to flickering of the bulb, the ballast hum, or the wavelength involved. Although research on this topic is at the early stages, it has been the focus of numerous studies (see *Science News*, April 20, 1974).

Polarizing diffusers may be one solution.

FIGURE 19

Using entire walls as display areas increases flexibility.



- **A home lighting environment should be simulated in areas where daily living skills are being taught.**

Incandescent lighting is useful for this purpose. Daily living skills activities occur frequently in special education not only in a centralized location but also in the basic instructional classroom space.

- **Carrels need their own task lighting, particularly if the side or back partitions block room light sources.**

Carrels are used for intensive concentrated work, and the lighting should support this effort.

- **An emergency lighting system should be provided for power failures.**

There should not be any time delay for the emergency system to become operational.

- **Remote ballasts should be considered to eliminate unwanted sound, especially in areas where there are hearing impaired students.**

- **Room lighting should minimize eye fatigue, distractions, and hyperactivity.**

These conditions may be caused by (a) extremely high levels of lighting and (b) extreme contrast between light fixtures and the ceiling surface.

- **Brightness of ceiling light fixtures should not distract students during activities when they are looking toward the ceiling.**

The frequency of this type of activity is greatly increased with special education services such as therapy activities (physical and occupational), perceptual motor or adaptive physical education activities, and activities usually associated with prekindergarten and primary age students.

- **Brightness and glare from the reflectance of surfaces should be avoided, as it can lead to fatigue and distraction.**

Special consideration should be given to the finishes chosen for or placed on floors, walls, and work surfaces. Glass and highly polished surfaces should be used sparingly.

- **Task lighting (focused lighting of a higher intensity than the remainder of the room) should be available to increase the lighting level of locations such as student work surfaces, counters, and display surfaces.**

Activities requiring an increase in visual attention such as fine motor development, daily living skills, and visual perception are prevalent in special education.

Small portable light fixtures are a flexible form of task lighting.

Direct lighting is required to accentuate an interpreter for the hearing impaired while a room is darkened to view a film, slide, or filmstrip.

- **Switches should be located for easy access by students and teachers, according to the respective need for their use.**

Consideration should be given to the age of students (especially their height and reach) and any physical impairments they may have. Wheelchair bound students should be given special consideration in locating light switches for their use (Figure 20).

Access to light switches may not be desirable for certain student populations such as the severely or profoundly handicapped or emotionally disturbed.

- **Lighting level controls (e.g., dimmer or on/off switching for portions of the room) should be considered as an alternative to standard on/off switching.**

The following factors are important:

1. To avoid complete blackout during audiovisual presentations, to aid in note taking, to facilitate visual communication between teacher and student(s), and to avoid behavior problems.
2. To lower lighting levels as an aid in controlling student behavior by suggesting less activity.
3. To add a factor of comfort to floor activities that may involve the supine position.

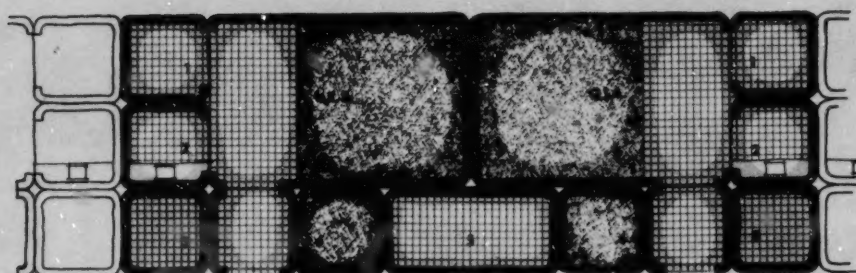
FIGURE 20

Switches should be located for easy access.



FIGURE 21

Lighting should be designed with the activity areas of the room in mind.



KEY

- O.I.A. GENERAL INSTRUCTIONAL AREA
- 1 ALCOVE
 - 2 COUNTER & SINK
 - 3 STORAGE
 - 4 OBSERVATION/INDIVIDUAL & SMALL GROUP INSTRUCTION
 - 5 TOILETS

- ☐ Varied light switching is required for flexible space utilization.

Separate light switches should be available for each space.

A master light switch for each suite of spaces is desirable.

- ☐ The number, size, and location of lighting areas and the switches to control them should be directly related to the activity areas of an instructional room (Figure 21).

Light switches should relate to room areas not rows of light fixtures. To determine the exact number and location of these zones, the following factors should be considered: (a) One zone is usually not sufficient to facilitate the diversity of activities taking place; (b) lighting zones can be related directly to the change in activities suggested by the use of different floor surfaces, for example carpet and vinyl tile; (c) younger students and/or more severely handicapped students tend to be simultaneously engaged in a variety of individualized activities; and (d) lighting controls are important for an area designated to be used specifically as a quiet room for students.

- ☐ The location, size, and quantity of windows must be related to the needs of specific student populations and staff.

Views to the out-of-doors are a valuable instructional tool. Outdoor views facilitate the study of weather, plant growth, the seasons, and other natural phenomena.

"Visual breaks" are important to special education teachers. Windows are a psychological benefit for teachers due to the quality of light and the opportunity to view the out-doors.

Windows may create a safety hazard for certain student populations such as the severely and profoundly handicapped or emotionally disturbed. Breakage would be the major concern. High windows may be one solution for this situation.

Windows can serve to facilitate the visual supervision of simultaneous indoor and outdoor activities.

Potential distractions from outside activities must be controllable by the teacher. This is of particular importance with emotionally disturbed, learning disabled, visually impaired, and mentally retarded students.

- ☐ The ability to darken the room for audiovisual presentations, television, or rest periods is a necessary feature which should be controlled by the teacher.

Venetian blinds, shades, and drapes are three means available, each satisfactory if well designed. These same means can be used to control natural light and to reduce glare and distraction.

- ☐ Natural light should be controllable to reduce unwanted heat gain or heat loss.

This is important for the basic comfort of students, especially those who have limited mobility or who are completely immobile.

- ☐ Natural light should be balanced with artificial sources.

The window design must take into account different sun orientations, angles, and movements.

Means for controlling the natural light to minimize glare and light intensity should be available. This is especially important for the easily distracted or visually impaired student.

ACOUSTICS

The way that sound is absorbed, reflected, and distributed along with the sources of noise and their transmission constitute the environmental characteristic of acoustics. Some special students have difficulty in concentrating on their activities and are distracted by noise. Other students are hard of hearing or deaf and require optimal acoustic conditions. Needless to say, acoustics is an area of considerable concern in special education facilities.

- ☐ Sounds and noise generated outside the room should not be transferred to the room.

FIGURE 22

Fluctuating ceiling height is an effective way to zone space acoustically.



For most handicapped students, and particularly for hearing impaired, visually impaired, learning disabled, and emotionally disturbed students, acoustic isolation is critical. Interfering sounds from outside sources can be distracting. Initial care in planning the school must be taken so as not to locate acoustically sensitive spaces near noise sources such as playgrounds, courtyards, multipurpose room, music room, gymnasium, or cafeteria. This in turn reduces the need to employ other means of providing acoustic isolation of individual instructional spaces.

- ☐ Noise levels within the room should be kept to a level that does not interfere with activities taking place.

Background noise is particularly detrimental to children with learning disabilities who have difficulty concentrating.

- ☐ Sound distribution within an instructional area should be controlled to permit several simultaneous activities, with different acoustic needs, to take place.

Special education programs often involve several simultaneous individual and small group activities.

Sound should be confined to the spatial zone in which it takes place.

Several separate spaces and/or acoustically controlled areas may be required within a room.

Fluctuating ceiling height in a room can be an effective way to zone space acoustically (Figure 22).

- ☐ Carrels used for individual instruction should shield out unwanted sound.

Carrels are intended to eliminate visual and physical distractions. Acoustic distractions should not be present.

- ☐ Teacher planning areas should be acoustically separated from the instructional areas.
- ☐ Sounds and noise generated within one academic room should not be transferred to other rooms.

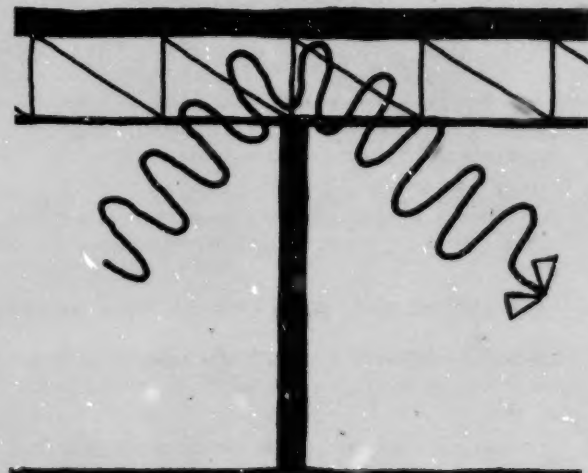
Acoustic leaks around doors or through ceiling plenums should be avoided (Figure 23).

- ☐ The acoustics of the room should support good sound distribution for large group activities, particularly voice articulation.

Instructions are often given by voice, and part of the educational program is listening to and following instructions.

FIGURE 23

Acoustic leaks should be avoided.



Ceiling heights should be no higher than 9 feet for good voice distribution.

Pitched ceilings of any height do not support good voice distribution (Figure 24).

- **Reverberations, echoes, and reflections must be controlled so as not to distort meaningful sounds.**

Distorted sounds do not reinforce good listening habits.

These acoustic characteristics are critical for hearing impaired students.

Reverberation time is particularly critical in fostering clear voice transmission.

- **The teacher should have control over admitting or eliminating outside sounds depending upon their instructional value.**

Loud unwanted sounds can seriously hamper instructional activities, whereas certain outside sounds are valuable instructional tools.

Portable acoustic panels with absorptive surfaces are valuable as acoustic separators.

Doors on all rooms and spaces give the teacher control over sound distribution.

Folding partitions also provide an acoustic option.

- **Noise generated by the heating, ventilating, and air conditioning (HVAC) system and by plumbing systems must not be transferred to the instructional space.**

One common source of mechanical noise transfer is the HVAC ducts. Low frequency noise from fans, if transmitted to the room, and duct noise tend to mask speech.

Toilet rooms adjacent to the educational space should not produce disturbing plumbing noise that can distract students.

Appropriate wall construction and devices that seal the door to the floor, head and jamb can be investigated (Figure 25).

- **Floors in the vast majority of educational spaces require acoustic treatment to reduce disturbing impact sounds.**

Impact noises are very disturbing to emotionally disturbed and hyperactive children.

Carpeting is one effective way of reducing impact sounds due to walking, furniture movement, and floor activities.

- **The acoustic treatment of walls must include both absorptive and reflective materials located to support the activity zoning of the room.**

Certain room zones can be acoustically alive whereas others can be acoustically dead. Commonly used reflective wall materials are concrete block, brick, gypsumboard, plaster, glass, and chalkboard. Commonly used absorptive wall materials are drapes, tackboard, and acoustic tile.

Some metal partition walls can cause noise problems through transmission and impact sounds.

CLIMATE

Climate in terms of the quality of air and its temperature is a vital aspect of each educational setting. Both students and teachers were particularly sensitive to this environmental characteristic and therefore highly critical of present inadequacies in their schools. The inability in most schools for teachers to control or adjust the heating, ventilating, and air conditioning is an inherent frustration. To quote one teacher, "The system is an all or nothing system—either it is too hot, too cold, not warm enough, not cool enough." The area of climate needs should receive priority planning attention.

There are several variables to the characteristic of climate. The activity in the space can be active and produce body heat or passive and require heat. Solar heat gain and/or loss is a variable. The physiological characteristics of the students themselves are highly variable in their sensitivity to climate. Finally, there is the ability of the heating equipment to maintain an even temperature and/or respond to thermostatic changes.

FIGURE 24

Pitched ceilings do not support good voice distribution.

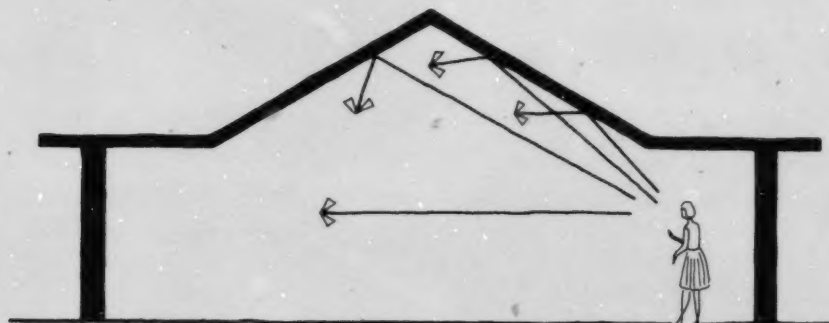
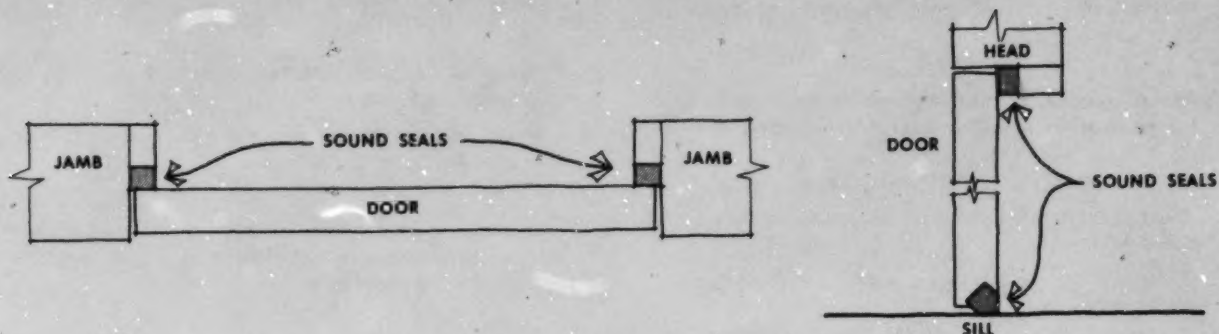


FIGURE 25

Appropriate devices can seal the door to the floor and jamb.



- The climate in each instructional area must be directly related to the critical needs of each special population and the particular instructional activities taking place.

Certain special populations (particularly the orthopedically handicapped) are relatively inactive and therefore susceptible to health problems and discomfort caused by air temperature variations, drafts, and hot-cold air zones. Vestibules may be one solution to avoiding changes in temperature and drafts where there is direct access to the outdoors (Figure 26).

Auxiliary power should allow the heating, ventilating, and air conditioning system to operate in power failures. This is desirable for all schools but particularly for schools that serve students with health impairments or physical disabilities.

Several characteristics of special education programs must be considered in designing the heating, ventilating, and air conditioning system:

1. Small and variable number of students (less body heat).
2. Poor blood circulation in some students.
3. Susceptibility to respiratory disease.
4. Number of activities occurring on or near the floor surface.
5. Wide variations in activities from relatively passive to very active.
6. Activities such as physical therapy and toileting that may require taking off clothing.

Physical discomfort from an undesirable climate has a more noticeable effect on the handicapped population (due to a low threshold of heat and cold tolerance) with regard to causing hyperactive behavior and withdrawal, particularly in emotionally disturbed and learning disabled populations.

High temperatures may create discomfort for students with assistive and adaptive devices such as braces, wheelchairs, and casts. Temperature variations may also influence teacher and child effectiveness due to fatigue and irritability.

- The teacher must be able to either depend on responsive mechanical climate control or have control of the climate in the instructional area.

Proper heating, ventilating, and air conditioning system design as well as a commitment to the hiring and training of personnel to operate this system properly are critical.

Changes in sun direction as well as weather changes throughout the course of the day must be considered.

Teacher control of the ventilation system is desirable, particularly in toilets, kitchen, art, and shop areas. With this control, the teacher can activate the system when it is needed.

Portable walls and movable partitions affect temperature and ventilation control.

Operable windows with screens are highly desirable when the proper temperature is not provided due to the lack of system response and/or system breakdown (Figure 27).

Teacher control of the temperature may be required in some instructional areas such as physical education and physical therapy. One option is to have control of the fan (i.e., off/slow/fast).

FIGURE 26

Vestibules can help minimize air temperature variations.

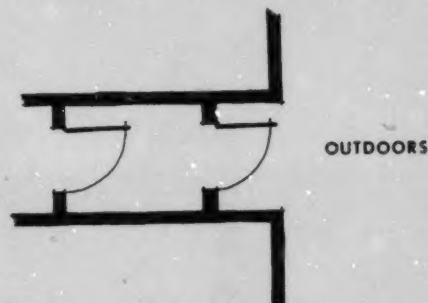
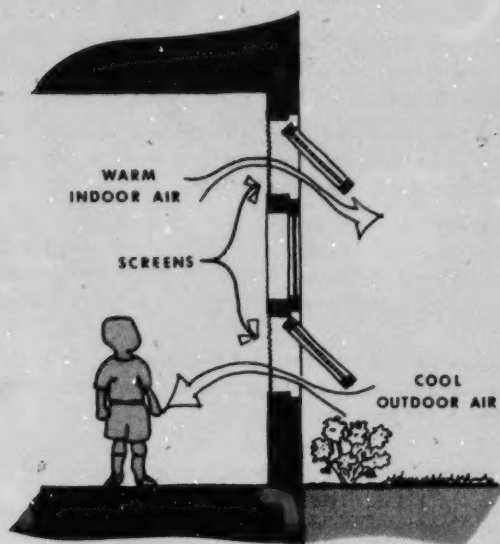


FIGURE 27

Operable windows with screens are highly desirable.



- The ventilation system must effectively provide fresh air in quantities and quality conducive to the instructional activities.

Natural cross ventilation between instructional areas is an effective option that can be teacher controlled (Figure 28). It does not work when doors or folding partitions must be closed.

Small enclosed spaces which occur frequently in special education programs are a particular ventilation problem.

They are often overpopulated and/or used for activities such as testing, observation, or quiet time.

Ventilating systems must provide fresh air to supplant stale air containing body odors, odors from toileting accidents, frequent toilet training activities, and food preparation, all of which are more prevalent in special education programs.

- The heating and cooling system must be effective in warming or cooling the space to the desired temperature.

Cold temperatures are a health hazard to many special populations, particularly the physically handicapped.

Large glass areas along southern exposures can admit solar heat which is desirable in cold winter climates.

Air cooling is needed in hot, humid climates and in instructional areas with large solar heat gain.

Air cooling is needed in spaces that generate body heat due to physical activities. These activities, such as physical therapy and occupational therapy, occur frequently in both centralized facilities and in the general instructional area.

- Temperatures, once selected, must remain stable with little variation throughout the space.

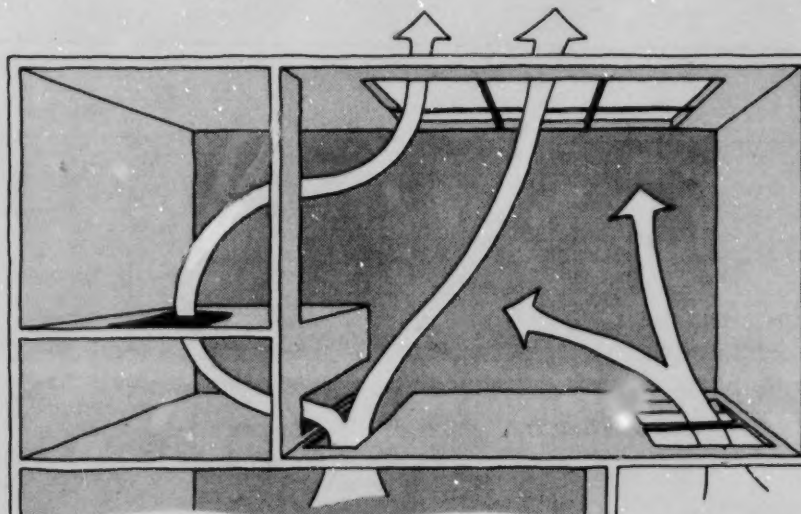
Hot and cold temperature zones may be created near large windows unless ameliorated by drapes, shades, or the heating, ventilating, and air conditioning system.

The floor surface should feel warm to facilitate activities on the floor. Carpet is one means of accomplishing this effect.

Hot and cold zones may also be due to an improperly designed mechanical system.

FIGURE 28

Natural cross ventilation is an effective option.



- ☐ **Pollutants such as dust, fumes, and odors must be kept out of the instructional area and/or eliminated through ventilation.**

Odors from cooking, toileting, art, shop, and other activities must be exhausted so as not to be transferred to other spaces.

A dust-free environment is required. This is particularly necessary for students with respiratory conditions.

Odors and fumes from magic markers, spray paint, pottery kiln, glue, and other such sources must be avoided.

UTILITIES

Utilities service in the instructional areas includes electricity, plumbing, and communication. They are usually built into the building and are therefore difficult to change. Thus, the need to plan carefully with future needs in mind is critical. Moreover, there is wisdom in slightly overplanning to provide additional capability now at a small fraction of the cost to provide it later. Minimal utility provisions and technical requirements are addressed in the prevailing building codes and therefore are not discussed here.

Special education is a rapidly changing field. New instructional techniques and attendant equipment are being developed continually. This has direct implications for the planning of utilities and highlights the importance of this environmental variable.

- ☐ **The types of utilities provided must be supportive of the educational program.**

A wireless loop in the ceiling is needed in some classrooms for the hard of hearing. If it is not initially provided, it

may have to be added later. The loop may also be required in some of the common use areas of the school.

It is desirable to have a listening system in the observation room which has an on/off switch, volume control, and area pick-up selector. Observation is an important activity in special education for parents and staff requiring utilities that do not disturb the activity being observed (Figure 29).

The decision to provide on-site videotaping capability must take into consideration the frequency of use and the requirement for specially trained staff.

A television jack is necessary in each classroom for the antenna system or cable television and also for closed circuit television. Television is increasingly being used in special education programs.

- ☐ **Telephone and intercom must be provided to facilitate communication between the classroom, administration, and community.**

A two way intercom between the central office and each classroom is necessary to provide for direct communication in cases of emergency or a need for staff aid. A call-back light or buzzer is desirable in some cases so as not to disrupt the classroom.

A public address system is optional if an intercom system is available. Announcements over the public address system can disturb the classroom activity, particularly for emotionally disturbed and learning disabled students.

Access to a telephone is mandatory for teachers to call parents and/or persons in the community. Special education teachers frequently use the telephone to contact parents, agency personnel, or persons in the medical profession. It may be provided in the classroom or in a separate telephone room shared by several classrooms. Privacy should be available.

FIGURE 29

The observation room requires utilities that do not disturb the activity being observed.

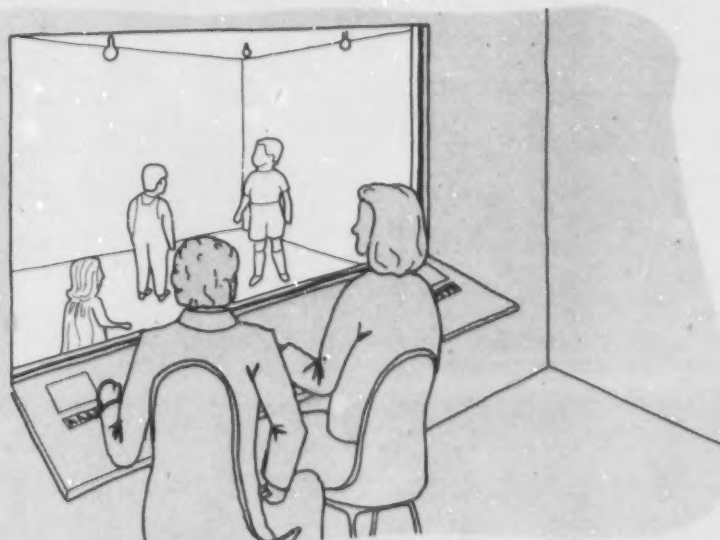
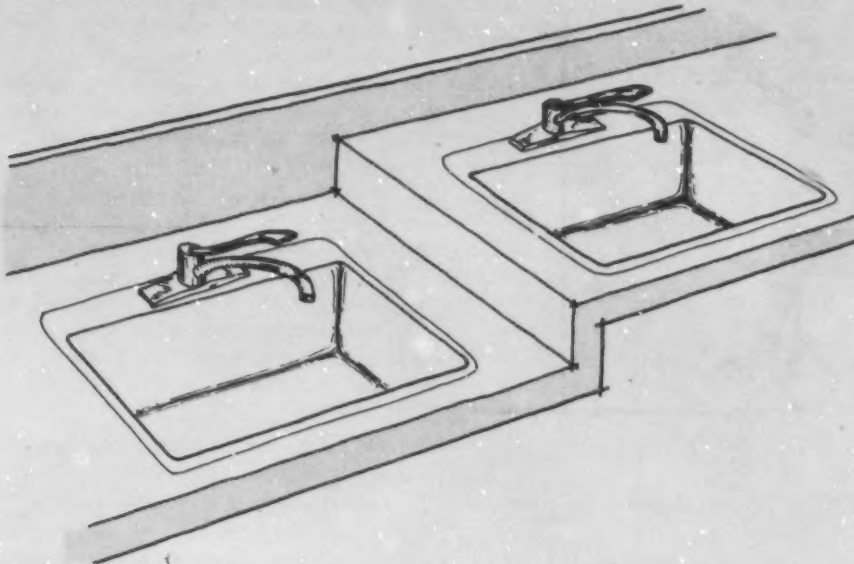


FIGURE 30

Plumbing facilities must suit the needs of staff as well as ambulatory and nonambulatory students.



- **Emergency systems must be provided according to the prevailing building codes to alert the staff and student population to emergency conditions.**

An emergency light system is essential. It should be synchronized with the fire alarm system to be activated automatically.

A visual fire alarm is required for the hard of hearing and deaf students. This consists of flashing lights in critical locations.

An auditory signal to work with emergency lighting is recommended to alert visually impaired individuals.

An emergency crisis button is needed in some classrooms to call for immediate outside help. This is especially needed in classrooms with profoundly and severely handicapped students or those students subject to seizures.

- **Plumbing facilities must be designed to suit the needs of the student population.**

Controls on the plumbing fixtures should be easily usable by both handicapped and nonhandicapped students. Push-button controls are not recommended. Faucets with long lever handles are desirable (Figure 30).

The location and access of toilet rooms relative to the classroom is dependent upon the specific needs of the student population in terms of their toilet training stage and/or proclivity for toileting accidents. In many cases, toilets immediately accessible from each classroom are necessary. This is particularly true in classrooms for very young students and other populations where toileting is an exceptionally frequent activity and/or viewed as a major

learning activity. In other cases, shared toilets between two or several classrooms may be appropriate. Centralized "gang" toilets are advantageous in providing learning experiences for some students. Some centralized toilets should be available in all schools to be consistent with the goal of having students function independently.

A sink, usually set in a counter, is necessary in most classrooms. Access and use of the sink is dependent upon the population in terms of age, physical disability, and program requirements. In some cases, two sinks of different heights are desirable to serve staff adults, ambulatory children, and nonambulatory children (Figure 30).

Drinking fountains are necessary in many classrooms. They may be combined with the sink. Children with certain physical disabilities require frequent drinking of water.

Hot water is necessary at the sink with automatic mixing valves to prevent burns. It is used to clean cooking utensils, hard to clean art tools, and other instructional items.

Tubs and showers should be considered when personal hygiene and clean-up are programmed activities.

Goose neck faucets on sinks cause splashing unless they extend deep into the sink well. Some students may use this opportunity to further spread water around the area.

- **Electrical outlets must be provided in sufficient quantity in appropriate locations to serve the needs of the instructional program.**

Heights of electrical switches and outlets should be accessible to those in wheelchairs. This should not exceed 4 feet above the floor (Figure 31).

The distribution or location of electrical outlets is more important than the absolute number.

FIGURE 31

Switches and outlets should be accessible to students in wheelchairs.



Floor outlets located in the central area of the room are highly desirable.

Safety caps should be available for all outlets and remain in place when they are not used.

An emergency power cutoff switch is required for classrooms involved with potentially dangerous equipment.

Movable partitions reduce the possibility of locating outlets in those walls.

- ☐ Clocks should be placed on walls at a height which is in the visual field of the student.

FIRE SAFETY

- ☐ The sense of moving in time and space simultaneously should be provided.

In a fire situation where exit time is important and panic may overcome a student, the sense of progressing in space over time may be critical. This sense of movement is especially important in hallways or other designated exit paths.

The environment can contribute to giving an appropriate sense of movement in several ways: varied colors and textures on wall, floor, and ceiling surfaces; varied lighting to designate junctions or changes in direction; and variations in the width, length, or height of a space (Figure 32). Long corridors with equal spacing of doors and light fixtures do not enhance the sense of movement (Bednar & Haviland, 1969).

- ☐ The distance to a fire exit must be carefully analyzed.

Direct access to the outdoors from each instructional area is most desirable.

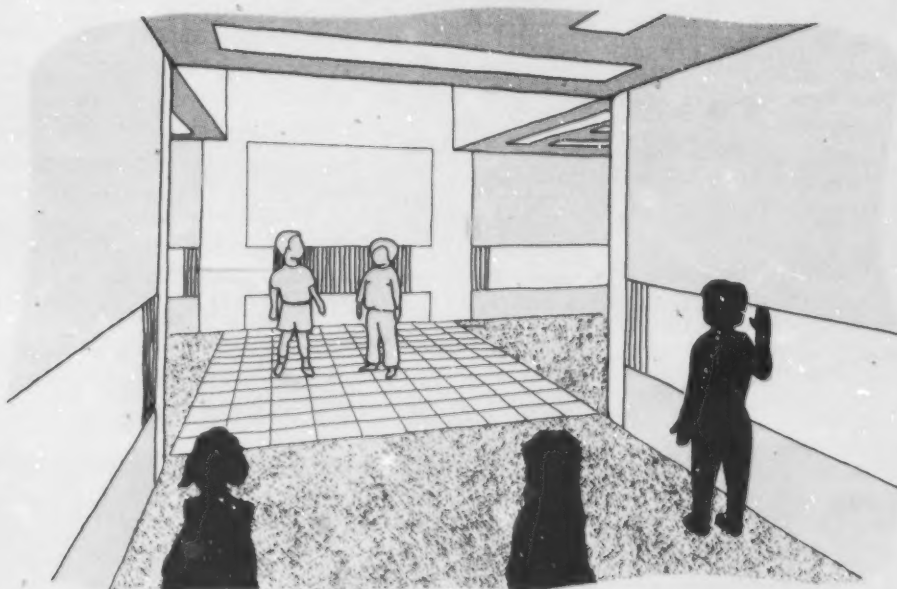
Where direct access to the outdoors is not possible, the allowable distance must carefully relate to the age and disability of the students involved. Local fire safety codes may not be sufficiently stringent in this regard.

- ☐ Techniques in addition to signage should be considered for distinguishing fire exits.

The use of color contrast and/or natural light may be appropriate (Figure 33).

FIGURE 32

Variations in color, texture, lighting, and dimensions can provide a sense of movement in exit paths.



- Circulation corridors should provide a safe and efficient pattern for exiting.

The width of corridors and exits should accommodate planned and potential student populations (Figure 34). In some situations (having considered all fire exiting variables), the corridor and/or exit may require a width greater than the minimum figure stipulated in the applicable local fire safety codes. This may be especially true when a large number of orthopedically and/or multiply handicapped students are being served.

Doors to rooms should not swing into the corridor in such a way as to decrease the functional corridor width (Figure 33).

- An exterior walkway should be provided around a large percentage of a school's perimeter to aid students (especially those with mobility problems and assistive devices) in circulating to safety in a fire situation.

OUTDOOR PLAY AREAS

- Careful consideration should be given to separating play areas from adjacent hazardous conditions such as service drives, roadways, and extreme changes in ground slope.
- Walkways should be provided around a large percentage of a school's perimeter and to and from outdoor play areas to aid student movement (especially students with mobility problems and/or assistive devices).

FIGURE 33

Use of natural light can distinguish fire exits.

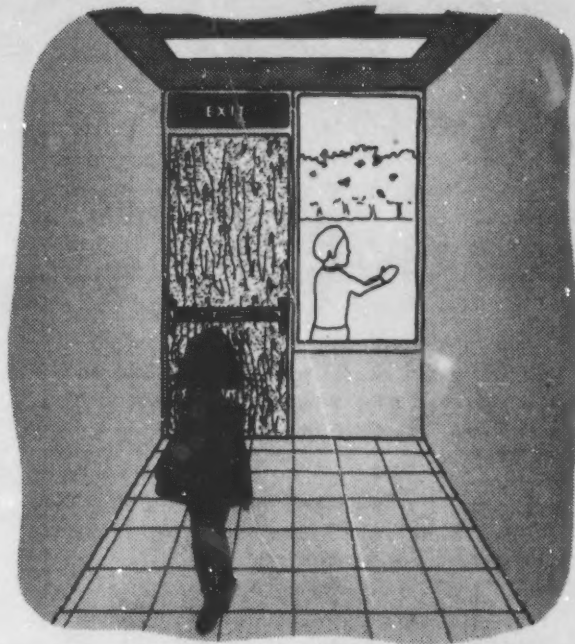


FIGURE 34

Wider unobstructed corridors may be necessary for specific student populations.

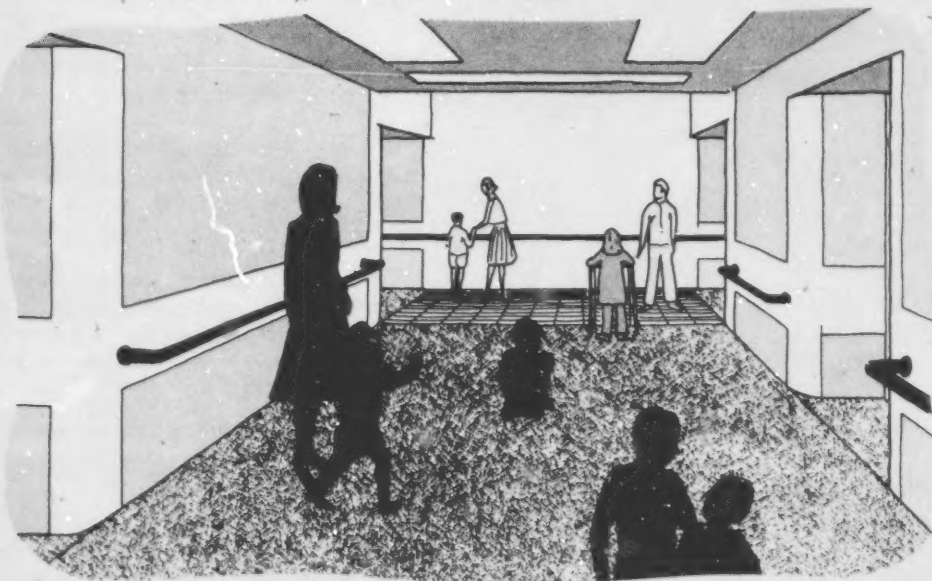
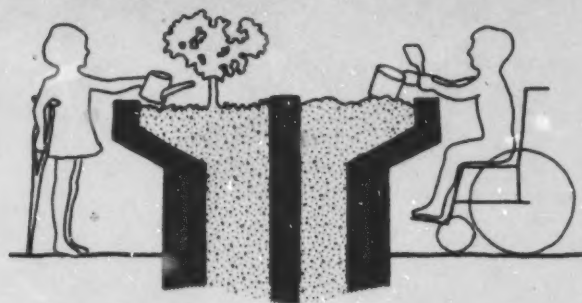


FIGURE 35

Elevated areas with cutouts are often needed for sand, water, and plant activities.



- The continuum of needs—from total separation to total integration—of nonhandicapped and handicapped students should be considered in the design of outdoor play areas.

The implications for the design of outdoor play spaces can be expressed by listing the characteristics of three types of areas that may be required:

1. Play areas for handicapped students physically separated from other play areas and adjacent to their general instructional area.
2. Play areas for handicapped students physically separated from other play areas.
3. The integration of play areas for handicapped and non-handicapped students.

- Overhead shading is necessary for many handicapped students.

Shading may be over a particular play area and/or adjacent to a play area.

FIGURE 37

Diversified surface materials should be explored.

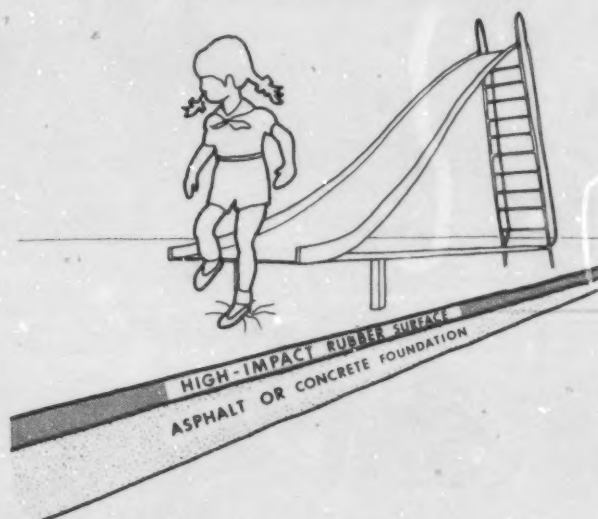
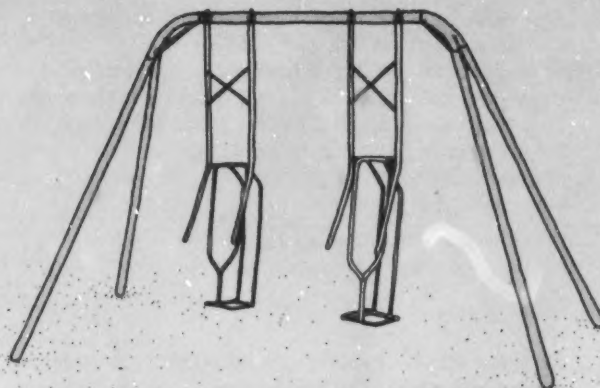


FIGURE 36

Modified equipment such as swings may be necessary.



Shading may be accomplished by a man made structure and/or shade trees.

- Toilet rooms should be provided in proximity to play areas and should be accessible from the outdoors.

- Handrails may be required in some play areas.

Handrails may be required to encourage students with limited mobility to participate in an activity.

Depending upon the student age range, handrails may have to be at more than one height.

- Activities with sand, water, or plants may need to be elevated and may require cutouts for wheelchair access (Figure 35).

- In many cases modified equipment will be necessary for participation by students.

One example would be the various adaptations required for a swing to securely contain a student, for example straps and/or a containing structure (Figure 36).

- The amount of spacing between pieces of play equipment requires careful consideration for safety reasons. Greater distances than typically provided may be required for some handicapped populations.

- Play equipment and surface materials will need to be more diversified to meet the needs of handicapped students.

Such materials as sand, bark, air inflated structures, rubber, and foam should be explored in addition to traditional hard surfaces and grassed areas (Figure 37).

FLEXIBILITY

- Architecture for special education services should be capable of responding or conforming to changing or new situations.

The cascade system discussed in chapter 1 suggests the need for fewer specialized spaces and more diverse regular spaces. Translated into architecture, this means that the instructional spaces for special education should be capable of being adapted or physically changed. Environmental changes should be possible on a daily basis.

During the facility planning process, future staffing and activities are projected to aid in designing a complementary building. It is impossible at that time to accurately determine the variety of activities that will actually take place during the life span of the facility. It could be said that attempting to design an environment at one point to fit the people and activities involved in special education at some future point is impossible to achieve. Special education activities occurring in any single space will tend to be greater in number and complexity than the average educational setting. Also, new and modified activities are introduced at a rapid rate during the life of the building.

Flexibility in facility design has often been considered as architecture with a singular approach to each environmental variable. Special education requires a flexibility that has

a commitment to diversity in each of the environmental variables. This approach to construction may add to the initial cost of a building. The initial cost of a room to serve a group of students is negligible compared with the yearly cost to maintain their educational program in that room. The staff using this space could in itself cost \$20,000 to \$50,000 per year. To reduce the size or the quality of this space by a few thousand dollars in the initial planning would be false economy if it reduces the effectiveness of the program.

After occupancy of a building, change becomes a major undertaking if flexibility is not originally designed into the building. Change is expensive to implement due to disruptions to programs and the cost of major renovation. If flexibility is designed into a facility initially, changes to meet program needs can occur more often and at lower costs.

Each of the environmental variables should be designed to respond to change. A few of the options that should be available include portable and adjustable chalk surfaces, shelves that are adjustable in height, more than one type of floor surface in a general instructional area, several types of student work stations, controls for lighting levels in sub-areas of an instructional space, supplemental table lighting, areas within an instructional area that provide varying degrees of acoustical isolation, and multifunctional furniture should be available.

Section 2: Design Criteria By Special Education Service

Curriculum Services

GENERAL INSTRUCTIONAL AREA

The general instructional area refers to one or more spaces in which preschool, elementary, and secondary handicapped students usually spend the majority of the day. These spaces may be only for handicapped students or for an integration of handicapped and nonhandicapped students. The programs vary considerably but usually include several of the following learning activities: math, language arts, social studies, self care skills and gross motor skills, science, socialization skills, occupational skills, home living skills, art, music, and sensory perception. This space is analogous to what is often referred to as the general classroom or home room.

The general instructional area also refers to those spaces used for only one of the following subjects: language arts, social studies, or math.

ACTIVITIES

Typical general instructional area activities include:

Reading	Eating
Writing	Cleaning

Discussions
Toileting
Grooming
Mobility training
Balancing
Tumbling
Painting
Cooking
Pasting
Viewing films
Listening to records
Writing on chalkboards
Speaking
Sawing
Hammering

Typing
Singing
Dancing
Sewing
Conferring
Observing
Testing
Paper cutting
Washing hands
Dressing
Game playing
Resting
Parent training
Exercising

GENERAL GUIDELINES

The two basic factors that determine the requirements for the general instructional area are people and activities. In regular education programs these two factors vary to a limited degree. In special education programs these two factors vary considerably. Some of the characteristics of the people and

activities that make special education so variable are discussed here.

Age of Students

Handicapped students are usually grouped by ability rather than strictly by chronological age. Therefore it is not uncommon to find students in a single class whose ages may span several years. This range may be greater with groups of more severely handicapped students.

Grouping of Students

Based on the individualized education program developed to meet each student's needs, individual and small group activities are the predominant method of grouping for instruction. With more severely handicapped children, groups may be as small as three to five, and students often receive instruction on an individual basis.

Staffing

The diversified instructional program requires a greater number and type of professional, paraprofessional, and volunteer. The general instructional area often has to accommodate at least two adults at any point in time. With some student populations the number of staff may be greater than two.

The Nature of Activities

Handicapped students present a variety of learning behaviors that require specific special education and/or related services to meet their individual needs. The child's strengths and weaknesses as well as individual learning style, ascertained by assessing the child's learning behaviors, will determine the type and level of service and frequency of service to be provided along the continuum of service alternatives.

Many diverse activities occur in the general instructional area. Three or more activities frequently take place simultaneously. In some situations each student may be engaged in a different activity at the same time. The nature of these activities can be quite different, and they often have varied environmental requirements. Examples of simultaneous activities include:

1. A small group viewing a film and two students involved in gross motor activities.
2. Five students reading and one student typing.
3. Two students sawing and gluing wood and eight students working on math problems in a group with a teacher.
4. One student receiving toileting skills, two students reading, one student practicing balancing skills, and five students painting.
5. One student separated from the group in a quiet area to gain self control and eight students reading.

As these factors involving people and activities become more diverse, so must the environment. Choices in the environment should be available and should usually be under the control of the teacher. Singular solutions to each environmental variable are not sufficient. For example, one type of flooring, lighting, or space will not adequately support programs in the general instructional area.

As stated in the introduction to this chapter, information is primarily organized by environmental variables and services. Some of the information in the general instructional area is organized by handicapping category. The use of categories does not suggest that students be grouped on this basis, but in relation to the services they require and individual needs.

SPACE

The worksheets for space guidelines presented here (Worksheets 1-7) assume that curriculum and related services, such as physical education, art, music, home living skills, and physical therapy, occur primarily in a centralized location in a school building and secondarily in the general instructional area. If more extensive activities are planned for these services in the general instructional area, additional space will be required and reference should be made to that service.

As a guide, these worksheets are only a basis from which to begin planning. The activities in the worksheets may not be all-inclusive or defined correctly for any particular program. This guide should be used in consultation with special educators and facility planners.

Square foot guidelines were not developed for health impaired and speech impaired students. This was not done because these two disabilities are usually subsumed into other categories of handicapped.

Worksheets 8 through 12 provide space guidelines for support activities to the general instructional area.

WORKSHEET 1
Space Guidelines for the General Instructional
Area for Deaf and Hard of Hearing Students

Activity	Square foot guidelines	No. of persons or spaces involved	x	Square feet per person or per space	=	Required net square feet
Basic instructional area						
Structured learning environment ^a	Preschool & Elementary: 70 sq. ft./student for 7 to 10 students. For each additional student up to 20, add 30 sq. ft./student.		x		=	
			x		=	
			x		=	
	Secondary: 70 sq. ft./student for 4 to 6 students. For each additional student up to 20, add 35 sq. ft./student.		x		=	
			x		=	
			x		=	
General classroom ^b	Preschool, Elementary, & Secondary: 30 sq. ft./student. This assumes the handicapped students represent less than 25-30% of the total class enrollment. When the number exceeds this percentage, additional square footage will be required.		x		=	
			x		=	
			x		=	
Other (Describe)			x		=	
				Total net sq. ft. required	=	

^aA classroom in which the handicapped students are grouped for services and in which they spend the majority or all of the school day.

^bA classroom in which the handicapped student(s) is integrated with nonhandicapped students into a regular classroom for all or a portion of the school day.

WORKSHEET 2
Space Guidelines for the General Instructional
Area for Mentally Retarded Students

Activity	Square foot guidelines	No. of persons or spaces involved	x	Square feet per person or per space	=	Required net square feet
Basic instructional area						
Structured learning environment ^a	Preschool & Elementary: 90 sq. ft./student for 5 to 6 students. For each additional student up to 15, add 25 sq. ft./student.		x		=	
			x		=	
			x		=	
	Secondary: 60 sq. ft./student for 7 to 8 students. For each additional student up to 15, add 30 sq. ft./student.		x		=	
			x		=	
			x		=	
General classroom ^b	Preschool, Elementary, & Secondary: 30 sq. ft./student. This assumes that the handicapped students represent less than 10% of the total class enrollment. When this number exceeds this percentage, additional square footage will be required.		x		=	
			x		=	
			x		=	
Other (Describe)			x		=	
				Total net. sq. ft. required	=	

^aA classroom in which the handicapped students are grouped for services and in which they spend the majority or all of the school day.

^bA classroom in which the handicapped student(s) is integrated with nonhandicapped students into a regular classroom for all or a portion of the school day.

WORKSHEET 3
Space Guidelines for the General Instructional
Area for Emotionally Disturbed Students

Activity	Square foot guidelines	No. of persons or spaces involved	x	Square feet per person or per space	=	Required net square feet
Basic instructional area						
Structured learning environment ^a	Preschool & Elementary: 110 sq. ft./student for 5 to 6 students. For each additional student up to 15, add 25 sq. ft./student.		x		=	
			x		=	
			x		=	
	Secondary: 55 sq. ft./student for 8 to 10 students. For each additional student up to 15, add 50 sq. ft./student.		x		=	
			x		=	
			x		=	
General classroom ^b	Preschool, Elementary, & Secondary: 30 sq. ft./student. This assumes that the handicapped students represent less than 10% of the total class enrollment. When this number exceeds this percentage, additional square footage will be required.		x		=	
			x		=	
			x		=	
			x		=	
Other			x		=	
(Describe)						
				Total net sq. ft. required	=	

^a A classroom in which the handicapped students are grouped for services and in which they spend the majority or all of the school day.

^b A classroom in which the handicapped student(s) is integrated with nonhandicapped students into a regular classroom for all or a portion of the school day.

WORKSHEET 4
Space Guidelines for the General Instructional
Area for Orthopedically Handicapped Students

Activity	Square foot guidelines	No. of persons or spaces involved	x	Square feet per person or per space	=	Required net square feet
Basic instructional area						
Structured learning environment ^a	Preschool & Elementary: 125 sq. ft./student for 5 to 6 students. For each additional student up to 14, add 30 sq. ft./student.		x		=	
			x		=	
			x		=	
	Secondary: 100 sq. ft./student for 5 to 6 students. For each additional student up to 14, add 40 sq. ft./student.		x		=	
			x		=	
			x		=	
General classroom ^b	Preschool, Elementary, and Secondary: 35 sq. ft./student. This assumes that the handicapped students represent 10% of the total class enrollment. When the number exceeds this percentage, additional square footage will be required.		x		=	
			x		=	
			x		=	
Other (Describe)			x		=	
				Total net sq. ft. required	=	

^aA classroom in which the handicapped students are grouped for services and in which they spend the majority or all of the school day.

^bA classroom in which the handicapped student(s) is integrated with nonhandicapped students into a regular classroom for all or a portion of the school day.

WORKSHEET 5
Space Guidelines for the General Instructional
Area for Specific Learning Disabled Students

Activity	Square foot guidelines	No. of persons or spaces involved	x	Square feet per person or per space	=	Required net square feet
Basic instructional area						
Structured learning environment ^a	Preschool & Elementary: 80 sq. ft./student for 6 to 8 students. For each additional student up to 15, add 35 sq. ft./student.					
			x		=	
			x		=	
	Secondary: 60 sq. ft./student for 8 to 10 students. For each additional student up to 15, add 30 sq. ft./student.		x		=	
			x		=	
			x		=	
General classroom ^b	Preschool, Elementary, & Secondary: 30 sq. ft./student. This assumes that the handicapped students represent less than 25-30% of the total class enrollment. When the number exceeds this percentage, additional square footage will be required.					
			x		=	
			x		=	
			x		=	
Other						
(Describe)			x		=	
				Total net. sq. ft. required	=	

^aA classroom in which the handicapped students are grouped for services and in which they spend the majority or all of the school day.

^bA classroom in which the handicapped student(s) is integrated with nonhandicapped students into a regular classroom for all or a portion of the school day.

WORKSHEET 6
Space Guidelines for the General Instructional
Area for Visually Handicapped Students

Activity	Square foot guidelines	No. of persons or spaces involved	x	Square feet per person or per space	=	Required net square feet
Basic instructional area						
Structured learning environment ^a	Preschool & Elementary: 60 sq. ft./student for 8 to 10 students. For each additional student up to 20, add 30 sq. ft./student.					
			x		=	
			x		=	
	Secondary: 60 sq. ft./student for 8 to 10 students. For each additional student up to 20, add 20 sq. ft./student.		x		=	
			x		=	
			x		=	
General classroom ^b	Preschool, Elementary, & Secondary: 30 sq. ft./student. This assumes that the handicapped students represent less than 25-30% of the total class enrollment. When the number exceeds this percentage, additional square footage will be required.					
			x		=	
			x		=	
			x		=	
Other						
(Describe)			x		=	
				Total net sq. ft. required	=	

^aA classroom in which the handicapped students are grouped for services and in which they spend the majority or all of the school day.

^bA classroom in which the handicapped student(s) is integrated with nonhandicapped students into a regular classroom for all or a portion of the school day.

WORKSHEET 7
Space Guidelines for the General Instructional
Area for Multiply Handicapped Students

Activity	Square foot guidelines	No. of persons or spaces involved	x	Square feet per person or per space	=	Required net square feet	
Basic instructional area							
Structured learning environment ^a	Preschool & Elementary: 140 sq. ft./student for 3 to 4 students. For each additional student up to 15, add 60 sq. ft./student.		x		=		
			x		=		
			x		=		
	Secondary: 90 sq. ft./student for 5 to 6 students. For each additional student up to 15, add 50 sq. ft./student.		x		=		
			x		=		
			x		=		
General classroom ^b	Preschool, Elementary, & Secondary: 35-50 sq. ft./student depending upon the type and severity of handicap. This assumes that the handicapped students represent less than 10% of the total class enrollment. When the number exceeds this percentage, additional square footage will be required.		x		=		
			x		=		
			x		=		
				Total net sq. ft. required	=		

^aA classroom in which the handicapped students are grouped for services and in which they spend the majority or all of the school day.

^bA classroom in which the handicapped student(s) is integrated with nonhandicapped students into a regular classroom for all or a portion of the school day.

WORKSHEET 8
Activity: Indoor Storage

These guidelines refer to requirements for a lockable storage room that is directly accessible to the general instructional area. The space guidelines for the general instructional area include space for cabinetry, open shelving, and counter area.

Square Foot Guidelines

1. Each general instructional area at the preschool and elementary level should be supported by a storage room at a minimum of 25-30 square feet.
2. At the secondary level only the general instructional areas that serve primarily handicapped students require a storage room of 25-30 square feet.
3. General instructional areas serving the orthopedically and/or multiply handicapped student usually require a storage room of a minimum of 50-80 square feet.
4. The shared use of the storage room should be considered between two or more general instructional areas. This may facilitate the storage and joint use of large or specialized equipment.
5. The most accurate manner in which to determine space required for a storage room is to develop a list of equipment and materials to be stored.
6. The amount of area required in a storage room will also depend upon the extent to which stored items should be readily accessible and thus better stored in cabinetry or shelving within the instructional area.

No. of storage rooms	x	Square feet per room	=	Required net square feet
	x		=	
	x		=	
	x		=	
	x		=	
		Total net sq. ft. required	=	

WORKSHEET 9
Activity: Toileting

These guidelines are for toilet rooms that are adjacent and directly accessible to the general instructional area.

Square Foot Guidelines

1. A minimum of 50 square feet for each instructional area. This space may require an area up to 150 square feet in consideration of the following variables:
 - a. Use by one or more students simultaneously.
 - b. Frequency and duration of the toileting activity.
 - c. Requirements for clean-up and/or changing area.
 - d. Need to store items such as clothing, diapers, and towels.

No. of toilet rooms	x	Square feet per toilet room	=	Required net square feet
	x		=	
	x		=	
	x		=	
	x		=	
	x		=	
	x		=	
		Total net sq. ft. required	=	

WORKSHEET 10
Activity: Planning by Professionals
and Paraprofessionals

Square Foot Guidelines

1. A minimum of 50 square feet per professional but no less than 80 square feet per space.
2. A minimum of 30 square feet per paraprofessional.
3. Space for planning can be centralized in the school or decentralized to relate to each general instructional area.

No. of persons or spaces involved	x	Square feet per person or space	=	Required net square feet
	x		=	
	x		=	
	x		=	
	x		=	
		Total net sq. ft. required	=	

WORKSHEET 11
Activity: Student/Teacher Work

These guidelines refer to a room that is adjacent and directly accessible to the general instructional area.

Square Foot Guidelines

1. A minimum of 25 square feet per person but not less than 80 square feet per space.

No. of persons or spaces involved	x	Square feet per person or space	=	Required net square feet
	x		=	
	x		=	
	x		=	
	x		=	
	x		=	
		Total net sq. ft. required	=	

WORKSHEET 12
Activity: Observation

These guidelines refer to a room that is adjacent and directly accessible to the general instructional area.

Square Foot Guidelines

1. A minimum of 10 square feet per person but not less than 50 square feet per space.
2. This space can be shared between general instructional areas.
3. If observation is a relatively infrequent activity, the student/teacher work area may also function for this purpose.

No. of persons or spaces involved	x	Square feet per person or space	=	Required net square feet
	x		=	
	x		=	
	x		=	
	x		=	
Total net sq. ft. required			=	

SPATIAL RELATIONSHIPS

- Direct, barrier free access to the outdoors should be provided from the basic instructional area.

Mobility and behavior characteristics of some students preclude their traveling to and using general play areas. A play area adjacent to the basic instructional area and possibly enclosed is required. This necessity relates primarily to the younger (preschool and elementary) and/or more severely and profoundly handicapped student population. This requirement should be considered for the orthopedically handicapped, multiply handicapped, and emotionally disturbed.

Safe and efficient egress during a fire situation and other emergencies must be provided.

Minimizing the travel time to outdoor play areas is an important factor.

Direct access to the outdoors facilitates the movement of play equipment such as bicycles, wagons, climbers, and balls.

Direct access allows outdoor and indoor activities to occur simultaneously with proper visual supervision.

Direct access provides outdoor activities with convenient access to toilet rooms located adjacent to the classroom. This is especially important for students with limited toilet control or skills.

Direct access provides opportunities for science and horticulture experiences.

- Particular attention should be given to providing convenient access to the bus loading/unloading and parent drop-off areas for preschool, orthopedically handicapped, and multiply handicapped students.

FIGURE 38

Classrooms serving primarily handicapped students should be physically integrated throughout the school.

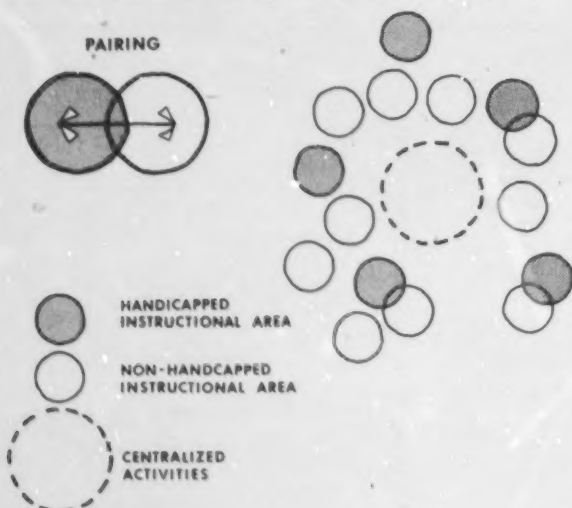
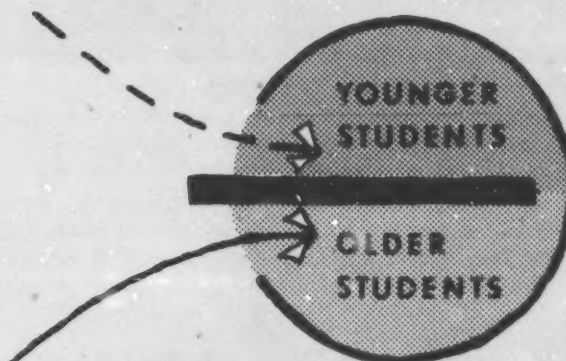


FIGURE 39

Classrooms serving preschoolers should be separated from those serving older students.



- Access to bus loading/unloading and parking areas should be convenient to the students involved in work-study programs and/or frequent field trips.
- Classrooms primarily serving handicapped students should be physically integrated throughout the school (Figure 38).

The nonhandicapped student's awareness and understanding of the handicapped student is increased.

Derogatory labeling of students by their peers may be reduced.

Communication for cooperation and understanding among staff members is improved.

Travel distances to and from classrooms is reduced, which decreases behavior problems en route.

Opportunities for integrating handicapped and nonhandicapped students are improved.

- Classrooms serving students who are orthopedically handicapped, multiply handicapped, severely and profoundly mentally retarded, emotionally disturbed, or visually impaired should be conveniently located to physical and occupational therapy service areas.
- Speech therapy services should be central to all classrooms, with the closest relationship to rooms serving deaf and hard of hearing, orthopedically handicapped, and multiply handicapped students.
- Classrooms serving a preschool age population should be located so as to minimize these students' interaction with the older students in the school (Figure 39).
- A toilet room that is directly accessible to the classroom should be considered.

The two major factors that require a toilet room to be adjacent are (a) the characteristics of students, such as limited toileting skills or control and (b) the need to closely supervise students' behavior.

An adjacent toilet room is usually required for preschool and elementary students who are orthopedically, multiply, emotionally, or mentally handicapped.

Adjacent toilet rooms should be considered for preschool and elementary level students who are visually and hearing disabled or who have specific learning disabilities.

The more severely and profoundly handicapped students at the secondary level may require adjacent lavatories. This requirement was specifically observed for the severely emotionally disturbed population.

- ☐ **One toilet room or set of toilet rooms can relate to two classrooms for maximum utilization of facilities.**

Two factors should be considered before accepting this design solution. First, the noises generated from an adjacent shared toilet room may pose a significant problem for maintaining appropriate behavior with some populations such as emotionally disturbed and mentally retarded students. Secondly, the frequency of toileting activities may make this shared use of toilet rooms impractical.

- ☐ **Where an adjacent toilet room is not required, special attention should be given to making "gang" toilet rooms convenient to the classroom.**

Mobility, supervision of behavior, and toileting skills are considerations that may be amplified with handicapped students.

The use of "gang" toilets may be an integral part of the instructional program.

- ☐ **There should be options for providing related services within or adjacent to the general instructional area.**

This may be advantageous for (a) maintaining the teacher's awareness and involvement in supportive services such as speech or physical therapy and therefore encouraging program continuity, and (b) heightening the awareness of nonhandicapped students to avoid the stigma of a student being labeled different or strange by peers.

An adjacent student/teacher workroom for individual and small group activities, such as auditory testing, speech therapy, physical therapy, one to one instruction, typing, viewing audiovisual materials, and quiet time, is desirable for most and required by some student populations.

This room should be acoustically isolated from the classroom but allow for visual supervision from the classroom (Figure 40).

When one of the main functions of the room is to serve as a quiet area where a student is placed to regain con-

trol over his or her behavior, it may be desirable to place this area convenient but not adjacent to the classroom to avoid disruptions of other simultaneous activities.

The sharing of an adjacent room between classrooms should be considered to maximize the use of this space (Figure 40). The frequency of use by one classroom, however, may make sharing impractical.

- ☐ **Storage must be adjacent with direct access to the classroom.**

This facilitates quick access to materials and equipment.

The necessity of a teacher or aide having to leave the room to retrieve a stored item is eliminated.

Shared storage between classrooms should be considered, especially when specialized equipment can be shared.

STORAGE

- ☐ **A wide range of types of storage should be available to the staff in each general instructional area to accommodate a diverse range of student characteristics, staffing, and activities. For this reason, some quantity of storage in the categories of open shelving, counter surface, and closed storage should be provided in every instructional area (Figure 41). The mix of each type to be provided will depend on a number of variables including, but not limited to:**

1. The number of students in the instructional area.
2. The requirement for student access to stored items.
3. The desirability of limiting student access to stored items in order to limit unwanted visual distractions or the chance of damage to stored items.

FIGURE 40

The student/teacher workroom should allow visual supervision.

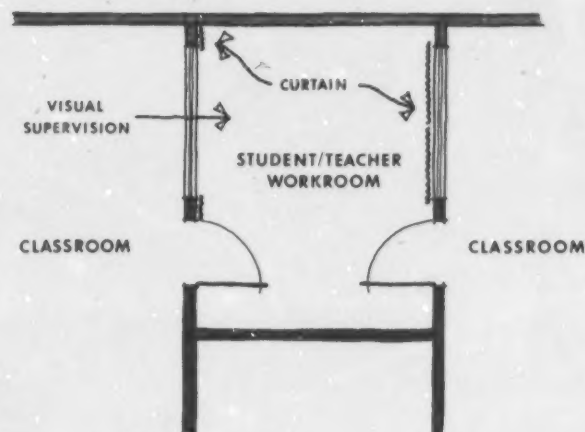


FIGURE 41

A wide range of types of storage should be available.



4. The need of security for expensive and/or not easily replaced items.
5. The size of items to be stored.
6. The frequency of use for a particular item.
7. The requirement of sharing an item with other instructional areas.
8. Proximity of the item to the location where it will be used.

- ☐ Each preschool, elementary, and secondary general instructional area should have 30 to 70 square feet of open shelving.

General instructional areas serving deaf and hard of hearing students generally require 70 to 120 square feet of shelving. For this population there is a greater emphasis on using visual training materials.

Shelving should be adjustable in height.

Shelving should provide stable surfaces for storing items.

Shelving should be provided in varied depths (8 inches to 36 inches) to accommodate the range in size of stored items.

Shelves 24 to 30 inches deep are useful in storing large print books for the visually impaired student.

- ☐ Each preschool, elementary and secondary general instructional area should have 20 to 50 square feet of counter surface.
- ☐ Closed storage requirements depend on the population served.

Hearing impaired

Preschool/elementary: 100 cubic feet
Secondary: 75-100 cubic feet

Mentally retarded

Preschool/elementary: 75-125 cubic feet
Secondary: 100-150 cubic feet

Emotionally disturbed

Preschool/elementary: 75-125 cubic feet
Secondary: 75 cubic feet

Orthopedically handicapped

Preschool/elementary: 150-250 cubic feet
Secondary: 100-200 cubic feet

Visually impaired

Preschool/elementary/secondary: 75-100 cubic feet

Learning disabled

Preschool/elementary: 75-125 cubic feet
Secondary: 75-125 cubic feet

Multiply handicapped

Preschool/elementary/secondary: 200-350 cubic feet

- ☐ Each general instructional area at the preschool, elementary, and secondary level which serves primarily handicapped students requires a storage room of 25 to 30 square feet.

General instructional areas serving orthopedically and/or multiply handicapped students usually require a storage room of 50 to 80 square feet.

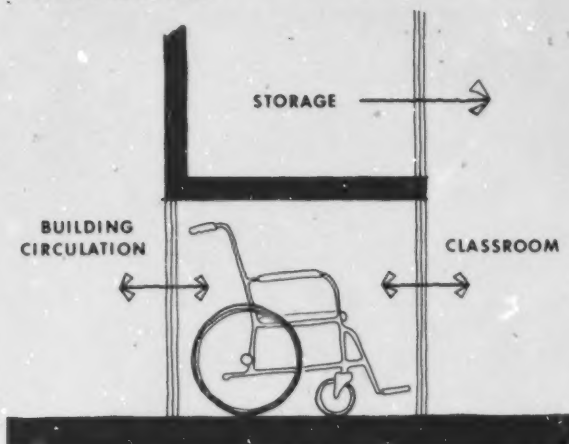
- ☐ Storage for wheelchairs, carts, walkers, and other adaptive or assistive devices may be required in some basic instructional areas. An effective way to provide this storage is shown in Figure 42.

FURNITURE AND EQUIPMENT

- ☐ The following items are examples of furniture and equipment that are typically used or made available to the majority of general instructional areas.

FIGURE 42

Storage for adaptive or assistive devices may be required in some classrooms.



Furniture: teacher desk and chair, student desks and tables, student chairs, file cabinets, carrels, coat storage cabinets, equipment cart(s), lounge furniture, portable space dividers, cots, shelving units, general storage cabinets, and typewriter tables.

Equipment: movie projector, filmstrip projector, slide projector, overhead projector, opaque projector, audiovisual screen, television set, cassette recorder, record player, radio, piano, typewriter(s), climatoriums, easels, calculator(s), fish tank, earphones and listening post kit(s), language master, toaster oven, hot plate, and play equipment.

- ☐ Some items of furniture and equipment are typically used by a specific student population.

Hearing impaired: small portable platform, auditory training and amplification equipment, portable mirrors.

Mentally retarded: refrigerator, range, auditory amplifier, sewing machine, ironing board, workbench, vise, vacuum cleaner, hand tools.

Emotionally disturbed: refrigerator and balance beam.

Orthopedically handicapped: rocking chair, water pillows, stand up tables, changing table, cutout table(s); low stools, mat table(s), portable chalkboard(s), specialized or modified chairs and tables, barrel tunnel, large and small foam shapes, crutches, canes, walkers, wheelchairs, wheelchair trays, exercise staircase, refrigerator, prone board(s), tilt board(s), mats, bicycles, tricycles, scooter boards, large print typewriter, potty chairs, slide and climbing apparatus, parallel bars.

Visually impaired: braille tape cassette, large print typewriter, braille, range, refrigerator, mats, auto-vance machine, large print books, abacus, slate and stylus, talking book machines.

Learning disabled: balance beam, range, bicycles, climbing apparatus.

Multiply handicapped: rocking chair, stand up tables, changing table, cutout tables, low stools, mat table(s), portable chalkboards, specialized or modified chairs and tables, large and small foam shapes, canes, walkers, wheelchairs, wheelchair trays, helmets, exercise staircase, range, refrigerator, prone board(s), vestibular board(s), mats, bicycles, tricycles, scooter boards, potty chairs, slide and climbing apparatus, parallel bars, bean bags, air inflated objects, high chair(s), mancino chair, pillows, play kitchen equipment, crib(s), trampoline, large print typewriter, braille tape cassette, auditory training and amplification equipment, hammock, mirror(s).

- ☐ Standard furniture and equipment often has to be modified to meet the needs of a particular student.

The majority of adaptations are made to meet the needs of the orthopedically or multiply handicapped.

Wood furniture is desirable because it is easily modified as compared to metal, plastic, and similar materials.

Chairs, for example, are often modified to increase their stability. Adding a board to the bottom of the legs provides for more floor surface contact.

Straps and padding are often added to chairs for safety and/or comfort.

Velcro can be added to furniture or equipment to hold crutches or canes.

- ☐ Desk storage, if required, should provide for the safe and efficient placement and retrieval of items. Flip top desks, which do not have a holding mechanism in the up position, can be dangerous to students with poor manipulation skills. Desks with side storage, as illustrated in Figure 43, are generally viewed as safe and functional.

- ☐ Portable chalk and tack surfaces are useful for students with mild to severe mobility problems.

FIGURE 43

Desks with side storage are safe and functional.

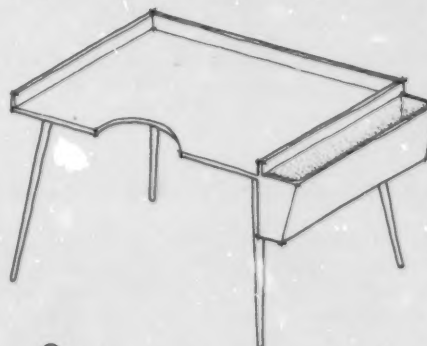
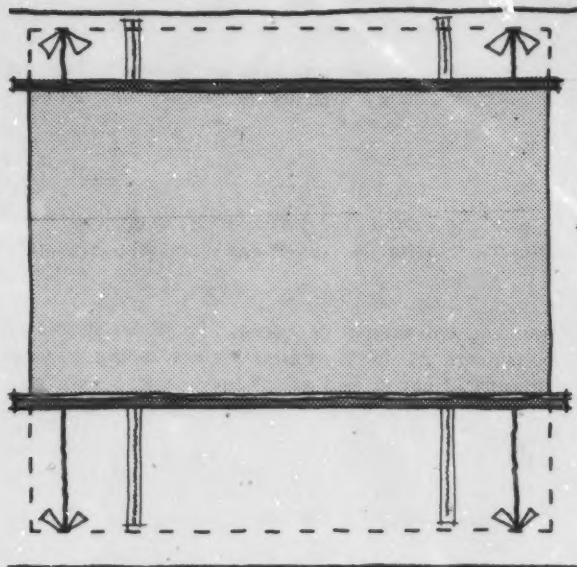


FIGURE 44

Display surfaces should be adjustable in height.



DISPLAY

- ☐ A variety of options for display should be available in every general instructional area and support space.
- ☐ Display surfaces should be distributed throughout the room to facilitate program flexibility. When display surfaces are available on all or most wall surfaces, options for individual and small group activities, visual stimulation, learning centers, and other program options are increased.
- ☐ Display surfaces that require student access should not be placed above counters, near circulation patterns, or in other locations that will inhibit use.
- ☐ All surfaces of chalk and tack boards or panels should be adjustable in height to accommodate a wide range of student age and disabilities (Figure 44). Adjustability also recognizes that some younger and/or more severely handicapped students require that display surfaces be available at floor level. Variable height is also important for some handicapped populations where access to display surfaces is particularly to be avoided.

Special designs are required for nonambulatory and semi-ambulatory students. Students in wheelchairs may require cantilevered chalk or tack surfaces. Grab bars may be appropriate for certain handicapped students.

Requirements for combined chalk and tack surfaces vary with the handicapping condition of the population served. Although the percentage of each type of surface varies considerably with program requirements, neither surface should be less than 25% of the total square footage specified. These figures apply to preschool, elementary, and secondary students.

Hearing impaired: 100-225 square feet
 Mentally retarded: 150-200 square feet
 Emotionally disturbed: 100-200 square feet
 Orthopedically handicapped: 100-200 square feet
 Visually impaired: 100-150 square feet
 Learning disabled: 100-200 square feet
 Multiply handicapped: 75-175 square feet

- ☐ In addition to chalk and tack boards, other display capabilities should be provided such as map rails with hooks and/or clips, tack strip, pegboard, ceiling suspension, projection screen, mirrors, display cases, and furniture units.

SURFACES

- ☐ Floor, ceiling, and wall material must respond to programmatic and individual student needs.

Floors

- ☐ A single floor surface material cannot adequately facilitate all programmatic requirements. A minimum of two floor surface materials is recommended: (a) a dense, resilient material resistant to damage by toileting accidents, food spillage, paint, and water and (b) a comfortable, warm material capable of facilitating activities directly on the floor such as reading, rolling, tumbling, and mobility training (Figure 45).

FIGURE 45

At least two different types of floor surface should be present in the instructional area.



- ☐ A change in floor surface gives all students, but specifically visually impaired students, a sense of their location in the room.
- ☐ A change in floor surface affords the instructional opportunity for students to learn to negotiate or maintain these surfaces.
- ☐ Generally, the larger percentage of floor surface should be the warm, comfortable material (65%-75%) with the remainder the dense, resilient material.
- ☐ A combination of carpet and vinyl asbestos tile is a functional solution.
- ☐ The exact percentage of each material required must be related to the specific student population and related services. Many factors affect the amount of each floor surface material required. A greater percentage of a comfortable, warm material should be considered when:
 1. A high frequency of activities occur directly on the floor. This seems to be prevalent with younger and more severely handicapped students.
 2. It is desirable to control general sources of sound and specifically sounds from students who are prone to seizures, disruptive behavior, or hyperactivity.
 3. Physical therapy, occupational therapy, or similar activities occur frequently in the classroom.

A greater percentage of a dense, resilient material should be considered when:

 1. Eating is a frequent learning activity in the classroom.
 2. Toilet training and potential accidents may occur in the classroom area.
 3. Student behavior is a significant factor in the damage of surface materials.
 4. A high frequency and/or large groupings are required for art and similar activities.
- ☐ Portable floor surfaces, such as rugs and mats, can offer options for special activities. The use of area rugs may, however, be inappropriate for populations in wheelchairs or with mobility problems.
- ☐ An area with a wood floor is recommended for preschool and elementary level hearing impaired students to accentuate rhythm for such activities as music, dance, and auditory training.
- ☐ Dense, nonresilient materials, such as terrazzo and ceramic tile, are not acceptable in classroom areas.

These surfaces can be slippery and/or cold and present serious hazards to students prone to falling due to poor balance or assistive devices.

- ☐ Toilet room floor surfaces adjacent to the classrooms should be nonslip and easily cleaned and maintained.

Ceilings

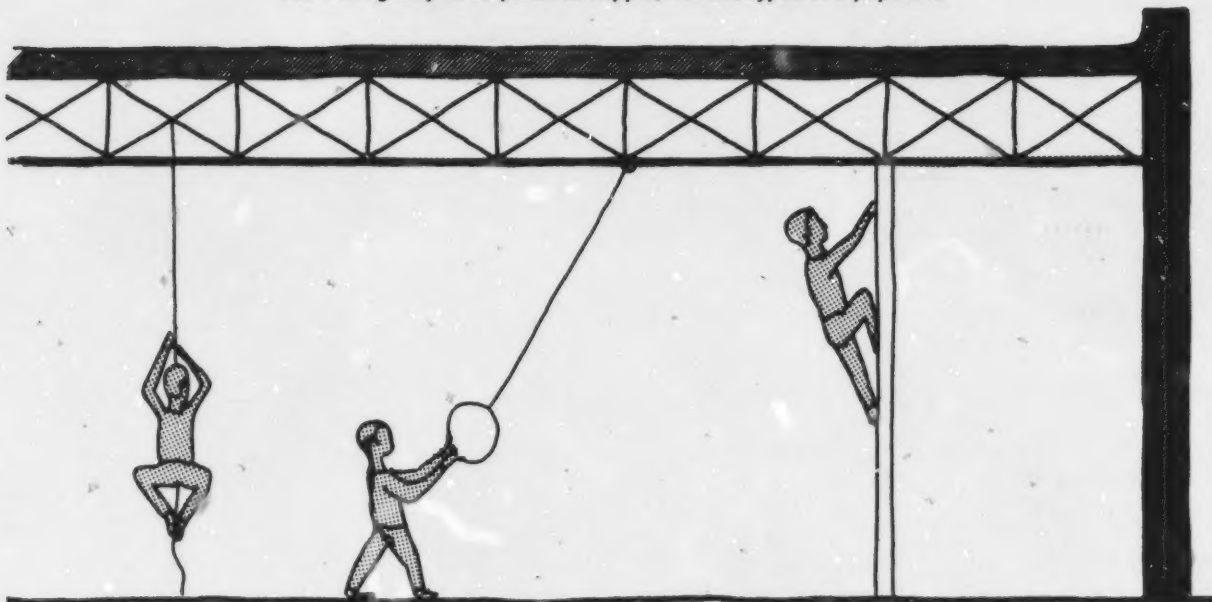
- ☐ The ceiling should have the capability of displaying instructional materials, student work, and other objects.
- ☐ A ceiling with acoustical absorption qualities should be considered as an alternative for controlling general sources of sound and specifically sounds from students prone to seizures, disruptive behavior, or hyperactivity.
- ☐ A standard acoustical tile ceiling is generally viewed as functional.
- ☐ The structure in or above the ceiling may be required to support equipment in programs serving orthopedically handicapped and multiply handicapped students (Figure 48). The equipment may include such items as hammocks, swings, and ropes.
- ☐ Ceilings that are easily reached and damaged by students should be avoided with certain student populations such as the emotionally disturbed.

Walls

- ☐ Wall surfaces should function as display surfaces to the maximum extent possible.
- ☐ Walls that function as a display surface in their entirety are preferable to providing display boards (tack or chalk) mounted on walls.
- ☐ Plaster, concrete block, and other nondisplay surfaces are acceptable only when sufficient tackboard and chalkboard are provided.
- ☐ Gypsumboard can create a warmer, homelike atmosphere but is prone to damage by certain populations such as emotionally disturbed and some orthopedically handicapped students.
- ☐ Walls that easily transmit airborne and impact sound are unacceptable.

FIGURE 46

The ceiling may be required to support various types of equipment.



- ☐ Movable walls can cause significant acoustical problems and often limit the amount of chalkboard, tackboard, and electrical outlets that can be provided.
- ☐ A change in wall texture gives students, especially the visually impaired, a sense of their location in a room.
- ☐ Variation in wall surfaces can be an instructional tool by heightening students' awareness of materials and providing opportunities for cleaning, repairing, and maintaining surfaces.

LIGHTING

Refer to Lighting in Section 1, General Building Design Criteria, of Chapter 3.

ACOUSTICS

Refer to Acoustics in Section 1, General Building Design Criteria, of Chapter 3.

CLIMATE

Refer to Climate in Section 1, General Building Design Criteria, of Chapter 3.

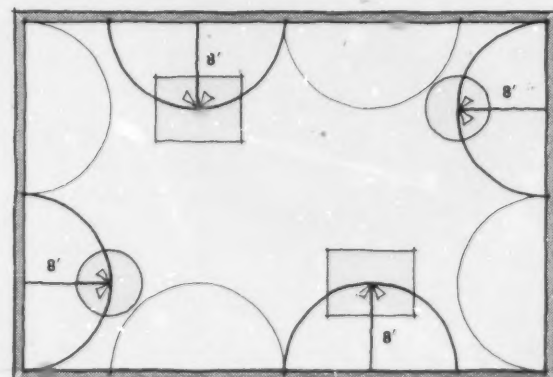
UTILITIES

Electrical Outlets

- ☐ The amount of equipment requiring power and the number of individual and small group activities occurring simultaneously are generally very high in special education programs.
- ☐ Activities occurring around the perimeter of the room should be within 8 feet of a wall outlet (Figure 47). The problem of insufficient outlets is often poor distribution rather than the actual number of outlets.

FIGURE 47

Activity areas around the perimeter should be located within 8 feet of a wall outlet.



- ☐ The central areas of the room may require electrical power and should be considered when either of the following factors are present:

1. Activities requiring electrical power are a considerable distance from a wall outlet.
2. Exposed electrical cords are undesirable for a particular population, for example, students with limited mobility skills, the emotionally disturbed, or visually impaired.

- ☐ Safety caps should be provided where required.

- ☐ Equipment needs should be clearly identified for such items as ranges, refrigerators, supplemental task lighting, kilns, hot plates, and toaster ovens, and the appropriate electrical power provided.

- ☐ Strip outlets concentrated at an area of a room should be considered only where students will be using several pieces of equipment simultaneously in one location such as in carrels.

Communication Systems

Refer to Utilities in Section 1, General Building Design Criteria, of Chapter 3.

Television

Refer to Utilities in Section 1, General Building Design Criteria, of Chapter 3.

AN ARCHITECTURAL INTERPRETATION

The research study focused more than one-half of its resources on the general instructional area. Sufficient data were available to present a detailed list of design criteria. The quality and quantity of information made it possible to compile these criteria and interpret them into three composite architectural statements.

The drawings shown in Figure 48 illustrate three ways in which the criteria in this section can be interpreted. It is from Figure 48(a) that other drawings have been developed on subsequent pages to illustrate several basic concepts that are critical to the success of the general instructional area (Figures 49-56).

There are undoubtedly many other composite architectural statements that could have been interpreted from the criteria. The three presented are not meant to be a blueprint but rather possible solutions from which basic architectural concepts can be examined.

FIGURE 48
Three architectural interpretations.

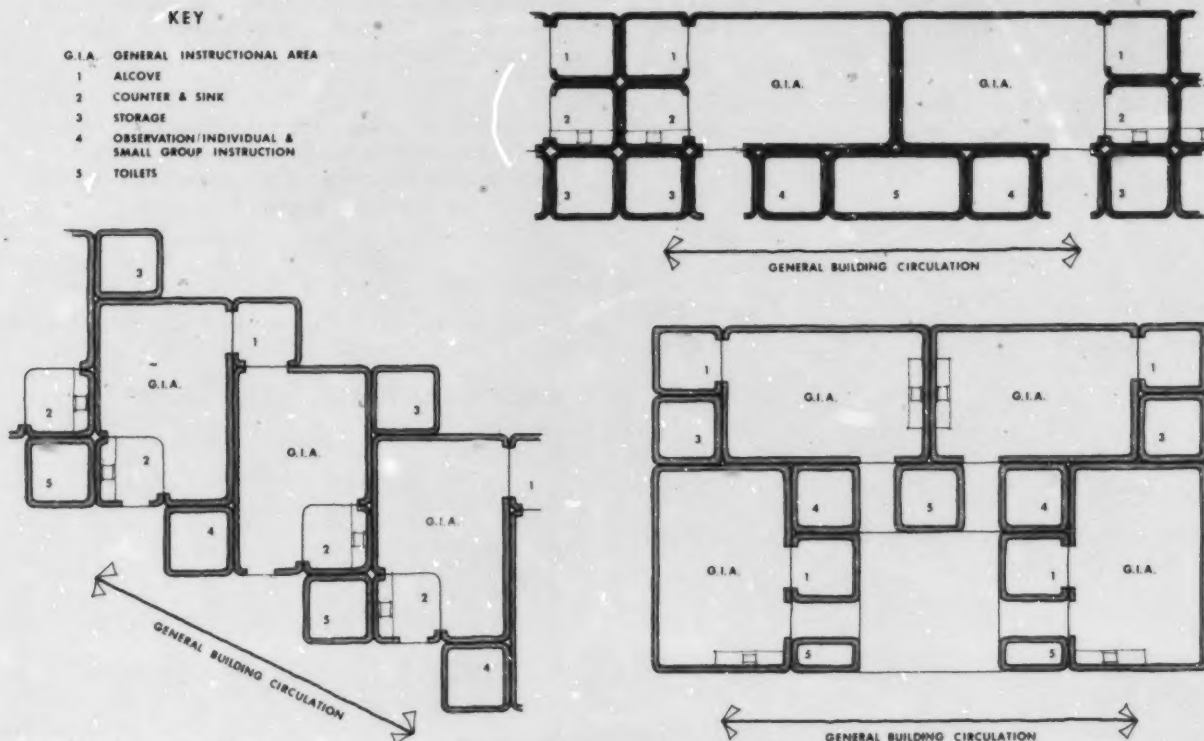


FIGURE 49

The GIA should have direct access to all support spaces and the outdoors and visual access to some support spaces.

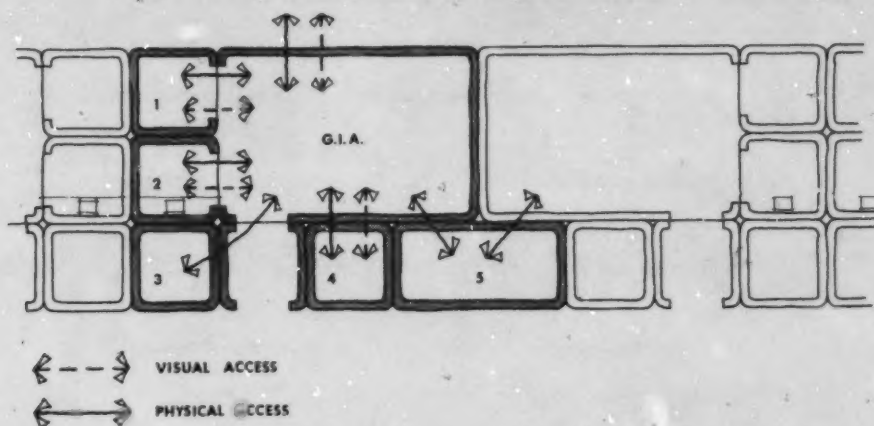


FIGURE 50

Support spaces to the GIA should be placed to maximize their function as acoustical barriers from the general building circulation and adjacent instructional areas.



FIGURE 51

A maximum amount of perimeter wall surface should be available for display and for furniture arrangements. Doors, windows, built in storage, and the like should be consolidated as much as possible to achieve this goal.



FIGURE 52

The primary circulation paths in the GIA should be simplified and concentrated. This pattern will aid in allowing activities to occur simultaneously and generally to facilitate options for grouping and furniture layout.

- KEY**
- G.I.A. GENERAL INSTRUCTIONAL AREA
 - 1 ALCOVE
 - 2 COUNTER & SINK
 - 3 STORAGE
 - 4 OBSERVATION/INDIVIDUAL & SMALL GROUP INSTRUCTION
 - 5 TOILETS

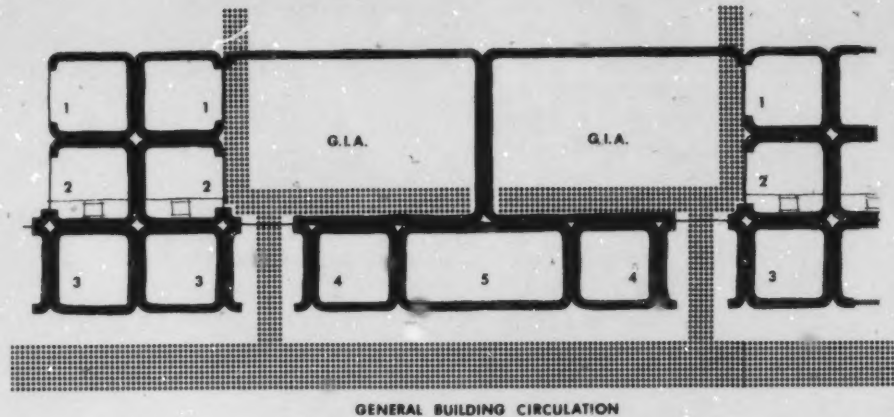


FIGURE 53

The location of lighting areas and controls directly relates to activity areas in and adjacent to the GIA.

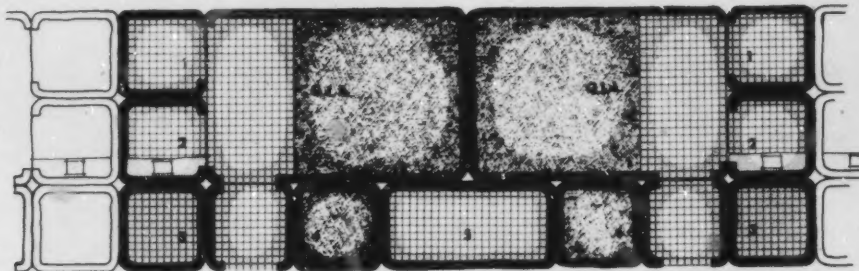


FIGURE 54

An observation/individual and small group instruction room should provide an entry without having to circulate through the GIA.

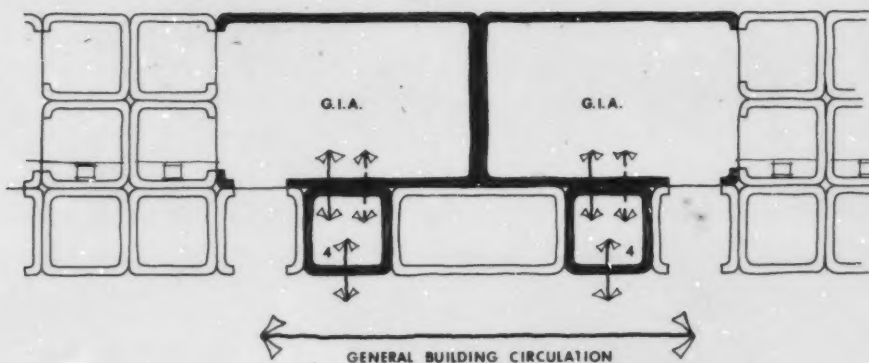


FIGURE 55

Storage and toilet rooms should be located to serve changing program needs. The configuration of storage space could change, for example, depending upon (a) the need for each GIA to have its own space, (b) the need for general building storage, or (c) the requirement for shared storage space between GIA's.

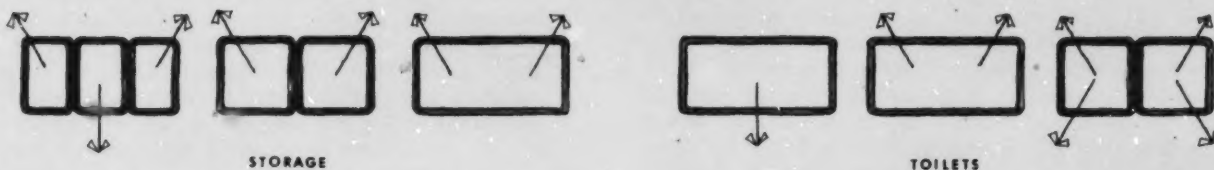
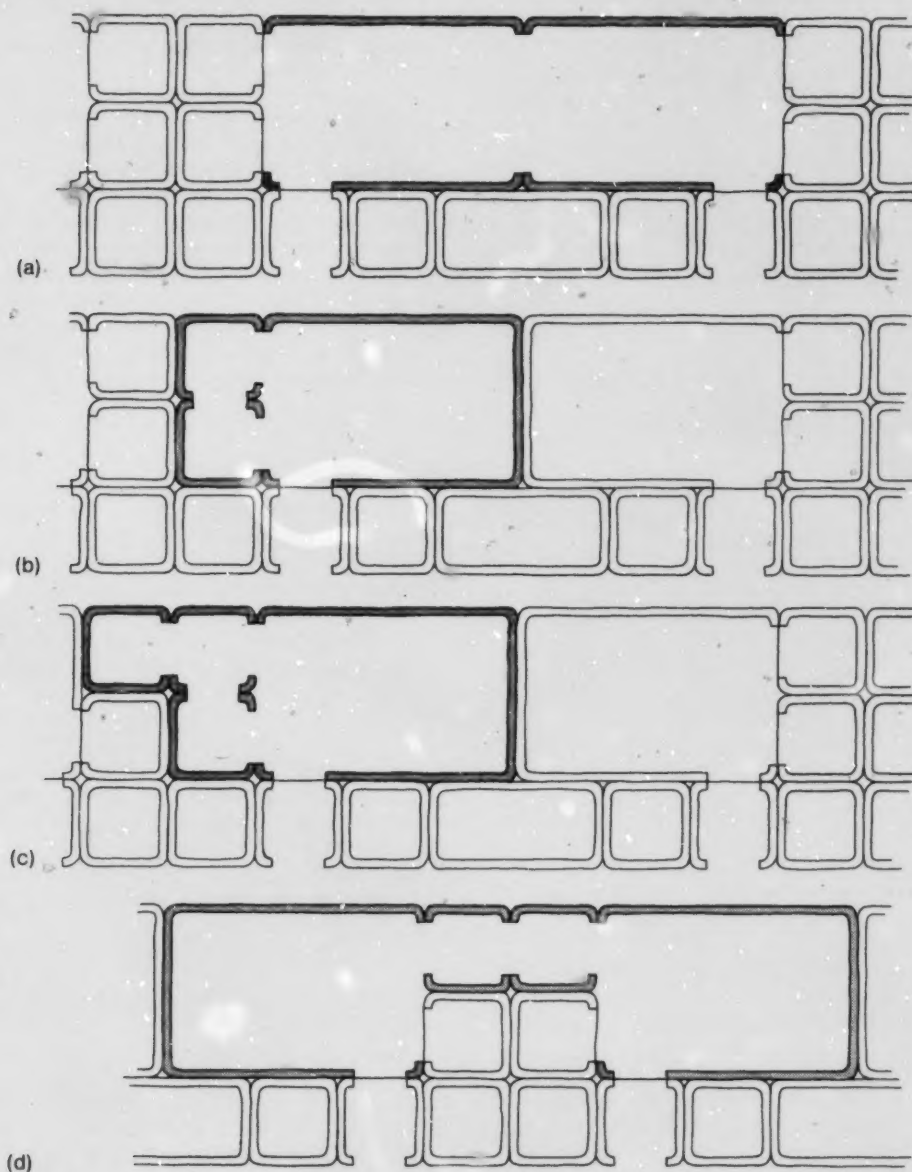


FIGURE 56

The spatial relationship of instructional areas should easily be modified during the life of a building. This is especially important in relating two basic instructional areas for cooperative programs.



ART

The art service involves experiences in (a) examining both natural and manufactured objects from many sources; (b) expressing individual ideas and feelings through the use of a variety of art media suited to the manipulative abilities and expressive needs of the student; (c) experimenting with art materials and processes to determine their effectiveness in achieving personal expressive form; (d) working with tools appropriate to the students' abilities in order to develop manipulative skills needed for satisfying aesthetic expression; (e) organizing, evaluating, and reorganizing work-in-process to gain an understanding of the formal structuring of line, form, color, and texture in space; (f) looking at, reading about, and discussing works of art (painting, sculpture, constructions, architecture, industrial and handcrafted products) using a variety of educational media and community resources; (g) evaluating art of both students and mature artists, industrial products, home and community design; (h) seeing artists produce works of art in their studios, in the classroom, or on film; and (i) engaging in activities that provide opportunities to apply art knowledge and aesthetic judgment to personal life, home, or community planning.

ACTIVITIES

Typical art activities include:

- Painting
- Shaping and firing clay
- Stenciling
- Drawing
- Film processing, enlarging, and printing
- Viewing films
- Soldering
- Hammering
- Casting
- Sewing
- Weaving
- Paper cutting
- Reading
- Listening
- Demonstrations
- Discussions

SPACE

Space requirements should be related to the number and type of students being served (see Worksheet 13).

- ☐ Both insufficient space and excess space must be carefully avoided. Insufficient space inhibits the use of specific equipment, options for student grouping, student mobility, and may cause safety hazards. Too much space can inhibit an educator's ability to offer quick assistance or have adequate visual supervision, and it may encourage problems with student behavior and/or concentration.

- ☐ Where art programs are provided in an integrated setting of both general and special education programs, the average class size in art may vary from 5 or 10 students up to 25 or 30 students. Considering that excess space may cause behavioral or concentration problems with some handicapped students, the ability to divide the art space into smaller components is necessary. This capability should particularly be considered for art programs serving the emotionally disturbed, mentally retarded, learning disabled, or multiply handicapped student. An art room, for example, of 1,200 square feet should be easily divisible by the educator into two smaller spaces of 800 square feet and 400 square feet.

- ☐ Careful consideration must be given to circulation around tables, equipment, and storage when semi-ambulatory or nonambulatory students are being served. Student independence and/or safety may be compromised if circulation space is insufficient.

- ☐ The need for assistance and individual attention is greatly increased in special education programs and requires that teachers and aides have good visual control and be able to move freely about the room from student to student (Figure 57). Teacher mobility and visual control are related to room proportions and to furniture and equipment layout (Figure 58). With this criterion in mind, it follows that all storage should be within or adjacent to the art room to limit the time an educator must leave the room. Storage across the corridor, for example, is unacceptable.

SPATIAL RELATIONSHIPS

- ☐ Access to toilet rooms should be a factor of the age, disability, and severity of the students being served. Facilities adjacent to the art room are required when students require assistance in toileting or have frequent toileting needs. Facilities that are convenient to the art room may be appropriate for those students expected to develop or exhibit independent toileting skills.

- ☐ The art room should be located conveniently to those students with severe mobility problems. While traveling throughout the school may be part of mobility training and consistent with the goals of independent functioning, distances must not discourage movement by creating unreasonable organizational and time problems.

- ☐ The art room should be adjacent and accessible to an outside work area.

- ☐ An alcove or distinct room should be considered for activities involving a kiln. This will aid in controlling safety and the presence of toxic fumes and heat.

WORKSHEET 13
Space Guidelines for Centralized Art

Activity	Square foot guidelines	No. of persons or spaces involved	x	Square feet per person or per space	=	Required net square feet
General activity area	Preschool and Elementary: 55 sq. ft. per student up to 20 students but not less than 800 sq. ft.		x		=	
	Secondary: 55 sq. ft. per student up to 20 students. For each additional student up to 30 students, add 40 sq. ft. per student. This area should not be less than 1,000 sq. ft.		x		=	
Storage	One space of not less than 100-250 sq. ft.		x		=	
Teacher planning	A minimum of 50 sq. ft. per person but not less than 80 sq. ft. This space may be combined with other teacher planning space.		x		=	
Observation	A minimum of one space at 50 sq. ft. or 10 sq. ft. per person.		x		=	
Other (Describe)			x		=	
				Total net sq. ft. required	=	

FIGURE 57

Good visual control is necessary for teachers.

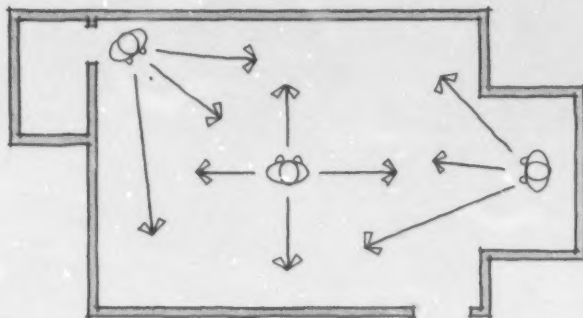
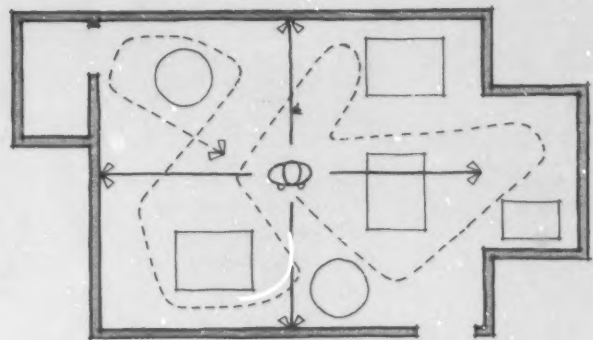


FIGURE 58

Teacher mobility is affected by room proportions and by furniture and equipment layout.



STORAGE

- For a centralized art area, the following storage requirements are recommended:

Open shelving: 50 square feet
 Closed storage: 250-350 cubic feet
 Counter surface: 50-75 square feet
 Storage room: 100-250 square feet

FURNITURE

- Furniture should support art activities which at times have to be highly individualized to relate to a student's particular level of work, behavior, or disability. In selecting work surfaces, one should consider a variety of factors.

Many handicapped students, including the emotionally disturbed, mentally retarded, and learning disabled, need to be separated by sufficient distance in a group situation to avoid disruptive interaction. Tables should be of a length and width to accommodate this arrangement efficiently without wasting table surface or cramping a student. Tables less than 3 feet wide can cause problems for many handicapped students. Materials can be dropped on the floor and a student may interfere with the activities of another student. For example, a 3 foot by 6 foot table is more functional than a 2½ foot by 5 foot table (Figure 59).

Some work surfaces may require lips at their edge to aid students having poor manipulation skills. Tables with cut-outs should also be considered for particular student populations (Figure 59).

Tables should be adjustable in height to accommodate students of various ages, sizes, and mobility modes.

Stand up tables may be appropriate for the more severely and profoundly handicapped students (Figure 60).

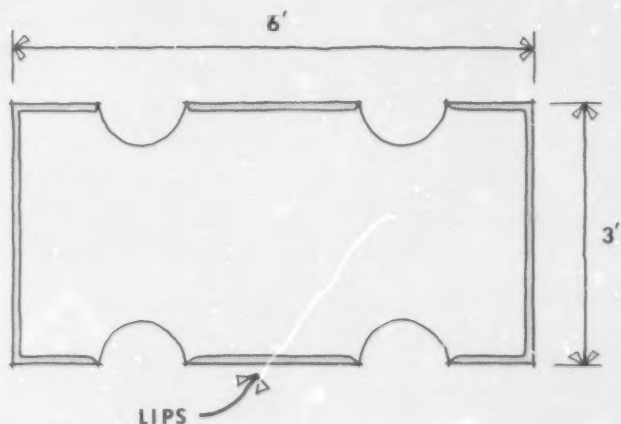
Often there is a need for a piece of furniture where a student can work individually or alone with a teacher or aide (Figure 61).

There are several reasons for providing this option for isolation:

1. To allow the educator to work individually with a student for evaluation purposes.
2. To separate a disruptive or hyperactive student from a group situation while simultaneously offering art activities until such time as the student can reenter a group activity with the appropriate behavior. This reason is particularly prevalent with emotionally disturbed, mentally retarded, and learning disabled students.
3. This piece of furniture can be an individual carrel or small cutout table placed in an area of the art room that offers some degree of physical and visual separation. The capability of the teacher to visually supervise this work station from any place in the room is required.

FIGURE 59

The size and design of tables used for art activities are important considerations.



EQUIPMENT

Examples of typical equipment used in art include:

Paper cutter	Kiln
Record player	Pottery wheel
Movie projector	Ceramic drying racks
Slide projector	Sewing machine
Projection screen	Looms
Table easels for wheelchair users	Vise
Standard easel	Hand tools such as saws, drills, and hammers

- ☐ An easel designed for the preschool learning laboratory of the Katherine Lilly Conroy Developmental Program at the Institute of Rehabilitation Medicine, New York University Medical Center, has proved to be very successful for severely and profoundly handicapped students. This particular design offers a wide range of height and angulation with adjustable trays (Figures 62 and 63).

DISPLAY

- ☐ Recommended quantities of display surfaces are as follows:

Tackboard: 100-200 square feet
Chalkboard: 32-48 square feet

- ☐ Capabilities for displaying three dimensional objects should be available.

SURFACES

- ☐ The floor surface should be easily cleaned but also should provide safety to students having mobility problems and/or using crutches, walkers, and other assistive devices.

A highly slippery floor material or protective finish can create serious safety hazards to students with mobility problems.

LIGHTING

Refer to Lighting in Section 1, General Building Design Criteria, of Chapter 3.

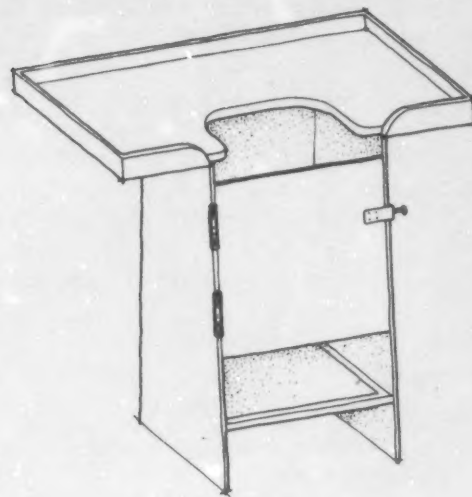
ACOUSTICS

- ☐ Art activities require acoustical isolation from adjacent activities.

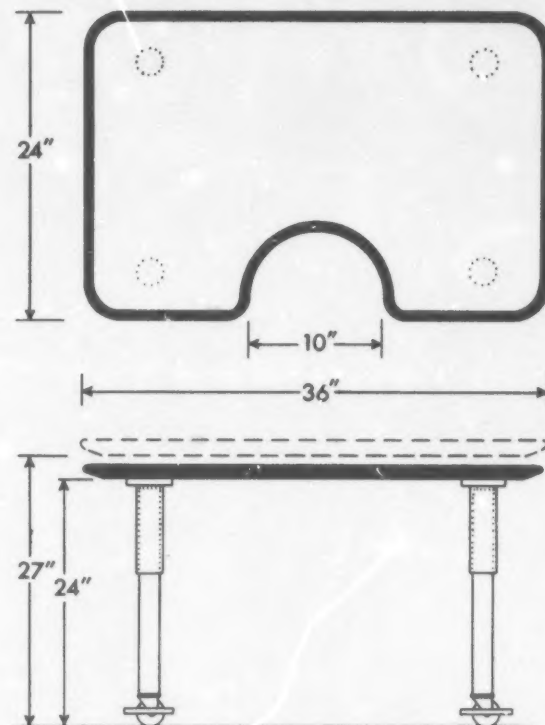
Adjacent activities can cause distractions to the hearing impaired, emotionally disturbed, or mentally retarded student.

FIGURE 60

A stand up table may be preferable for some students.

**FIGURE 61**

The isolation table allows a student to work alone or with the teacher or aide.



Reprinted with permission from Gordon, R. The design of a preschool hearing laboratory in a rehabilitation center. *Rehabilitation Monograph 39*. New York: Institute of Rehabilitation Medicine, NYU Medical Center, 1969, p. 54.

CLIMATE

- ☐ Particular care must be taken to provide ventilation systems that can adequately deal with fumes and odors from rubber cement, magic markers, paint, kilns, ceramic drying, and other activities.

There is an indication that some handicapped students are more susceptible to loss of concentration and/or inappropriate behavior due to environmental discomforts.

Good ventilation is especially important to those students that suffer from or are susceptible to respiratory problems.

Kilns should be located in an area (possibly separate from the classroom) which has a vent to deal adequately with toxic fumes and heat.

UTILITIES

- ☐ Sinks should be provided in type and number to facilitate clean-up activities.

The time allocated for art is limited and a significant amount of this time is involved with clean-up activities. Handicapped students' clean-up activities can be very time consuming.

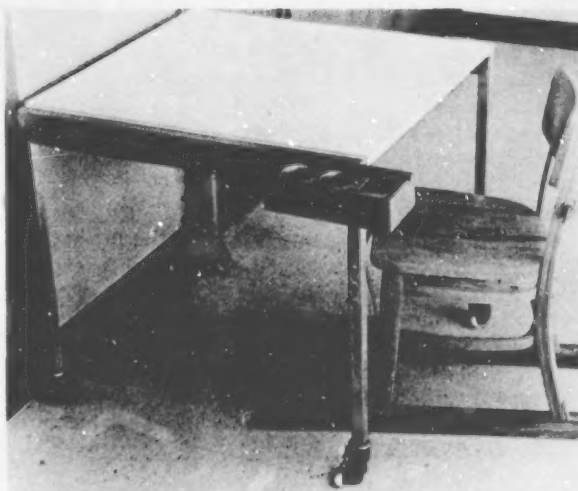
Provision should be made for at least two sinks. This will significantly reduce clean-up time by aiding in access and organization.

Both sinks should be accessible to students in wheelchairs, with appropriate faucet controls.

Sinks should have heavy duty sediment traps.

FIGURE 62

This specially designed easel has proved successful for severely and profoundly handicapped students.

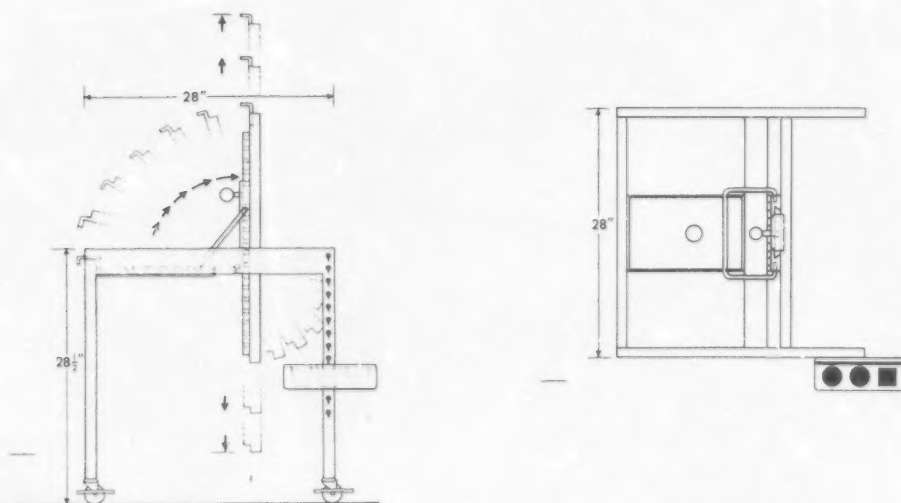


Invented and patented by Professor R. Gordon, NYU Medical Center. Reprinted with permission from Gordon, R. The design of a preschool learning laboratory in a rehabilitation center. *Rehabilitation Monograph 39*. New York: Institute of Rehabilitation Medicine, NYU Medical Center, 1969, p. 46.

- ☐ The art room should have direct communication with the office, especially for emergency situations.
- ☐ Emergency power cutoff switches should be located in several locations in the art area.

FIGURE 63

The easel offers a wide range of heights and angulation.



Invented and patented by Professor R. Gordon, NYU Medical Center. Reprinted with permission from Gordon, R. The design of a preschool learning laboratory in a rehabilitation center. *Rehabilitation Monograph 39*. New York: Institute of Rehabilitation Medicine, NYU Medical Center, 1969, p. 45.

HOME LIVING SKILLS

Home living education has as its objective the preparation of students for skillful execution of activities of daily living. Although a number of variations occur in home living programs or programs that have home living components, subject matter generally includes information, skill knowledge, and practice that enable students to:

1. Provide a home environment that satisfies family life needs at all stages of the life cycle.
2. Nurture the young and promote healthy growth and development.
3. Manage the purchase, preparation, and consumption of food as well as clothing, housing, and other goods and services that are necessary for physical, social, and psychological needs.
4. Make rational decisions concerning the use of material and human resources.
5. Perform the physical activities related to homemaking in a manner that contributes to individual and family goals.

ACTIVITIES

Typical home living activities include:

Grooming	Appliance repair
Cooking	Toileting
Sewing	Bedmaking
Ironing	Interior painting
Banking skills	Telephone skills
Storing	Consumer skills
House cleaning	Wall papering
Clothes washing and drying	Lawn care
Dining	Planting and gardening

SPACE

Space requirements for home living skills vary significantly depending upon the student population.

- ☐ When home living skills occur primarily in the general instructional classroom, additional space will generally be required. The exact amount of area to be added will relate directly to the activities planned. For example, cooking and dining activities may require additional space for dining, counter surface, and the storage of equipment, instructional items, and utensils (such as a refrigerator, oven, knives, forks, place mats, books, and towels).

- ☐ A space guidelines worksheet for a centralized home living skills area was not included due to the extremely wide variation between programs and an insufficient quantity of data collected in this study.

SPATIAL RELATIONSHIPS

- ☐ The location of facilities should reflect the composite needs of the student population.

Home living programs are offered through a variety of programmatic structures ranging along a continuum. This continuum ranges from curriculum components as part of the general instructional area to a more centralized or possibly departmentalized program. At any point along the continuum the activities can be singular and simplified or diverse and complex, depending upon individual student needs. In general, however, as the diversity and complexity of the activities increase, so does the need for a consolidated facility. In some cases this facility is best located central to all students. In other situations the priority of need may place it adjacent or in close proximity to a particular handicapped population.

It may be appropriate to have a centralized home living skills area, but one which is also adjacent to the general instructional area(s) serving the student population using this space most frequently (Figure 64). This was observed, for example, in relation to mentally retarded students.

- ☐ Home living activities may have programmatic relationships with the school kitchen and cafeteria. The knowledge and skills in the area of food planning, preparation, and consumption have specific transfer possibilities in the school kitchen and cafeteria area. Consequently, these areas must not only be considered in terms of accessibility for the handicapped but may also need to function as a training area.
- ☐ Home living activities often are related or overlapped with vocational or industrial arts and may require adjacency or convenient access to these programs.
- ☐ If observation space is provided, it should be accessible without having to pass through the instructional area (Figure 65).
- ☐ Direct access to the outdoors is desirable.

Access can facilitate such activities as gardening or lawn care.

FIGURE 64

The centralized home living skills area should also relate to the students most frequently served.

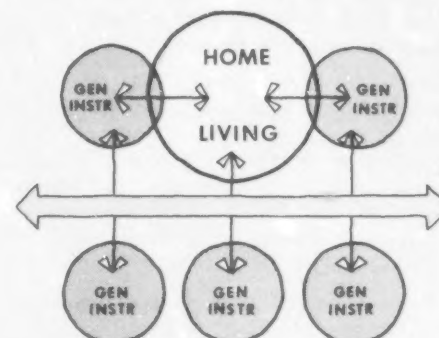
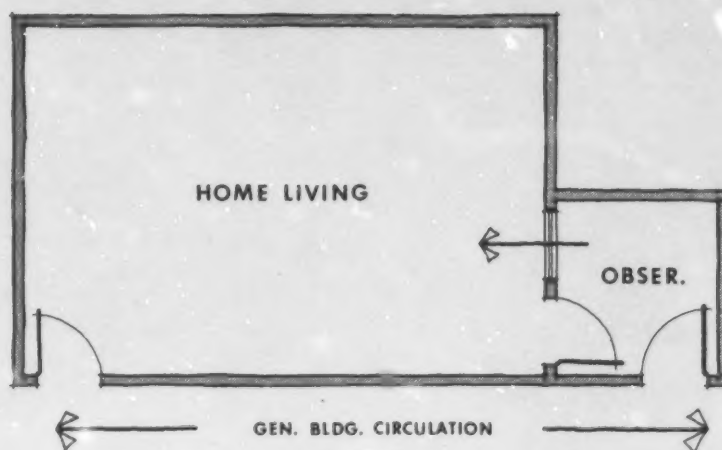


FIGURE 65

The observation room should be accessible without having to pass through the instructional area.



☐ **Access to toilet facilities must be studied carefully.**

Access varies depending upon the student population. In some situations access must be direct from the instructional area. At a minimum, access should be convenient.

Toilet facilities are often part of the home living skills area for instructional purposes.

☐ **An office space adjacent to the main instructional area(s) can be useful for teacher files and planning activities. If vocational or work/study activities are related to the home living area, this space can accommodate interviewing or counseling activities.**

☐ **If work/study activities are part of the home living program, convenient access to the main entrance and parking facilities is desirable.**

STORAGE

☐ **The quantity and type of storage should relate to the specific needs of the student population. It is difficult to generalize storage needs for home living skills because of the variation in activities between programs. Some guidelines can be recommended, however.**

Simulated home environment areas should have the amounts and types of storage typically provided in the home. In addition, storage should be provided for instructional materials and equipment. Toilet facilities, for example, will require related storage for such items as hair dryers and other grooming equipment, towels, toilet paper, and cleaning products.

Storage areas, such as pantry storage, linen closets, and kitchen cabinets, should be designed to make a percentage of the storage accessible to physically handi-

capped students. Design features, such as the counter heights, the depth of shelving, and the amount of floor area for circulation, should take this population into consideration.

A lockable storage room is required for all centralized home living skills areas. This space should not be less than 50 to 80 square feet, although it may have to be larger for some programs.

Some storage should be lockable to store tools or equipment that need to be locked up for safety.

FURNITURE

Examples of furniture used in the home living skills area include:

Household furniture (bed, couch, chair, dining table, chest of drawers, coffee table)	Shelving
Hamper	Woodworking table
Sewing table	Typewriter table
	Desk
	General work table
	Student chairs

EQUIPMENT

Examples of typical equipment used in the home living skills area include:

Oven	Record player
Clothes washer	Tape recorder
Clothes dryer	Film projector
Sewing machine	Projection screen
Various small household appliances	Typewriter
Refrigerator	Calculator
Freezer	Hand tools
Ironing board	Cash register
Hair dryers	Jig saw
Vacuum cleaner	Table vise

DISPLAY

- ☐ Some portion of the requirements for chalk and tack surfaces should be portable for added flexibility.

SURFACES

- ☐ A centralized home living area should provide a variety of wall and floor surfaces as instructional resources.

A variety of surfaces will facilitate activities such as painting, waxing, wall papering, and rug cleaning.

Surface materials should be chosen to provide simulated home and/or work experience.

Surface materials should be chosen to functionally support particular activities such as cooking and woodworking.

LIGHTING

- ☐ Each activity area (e.g., kitchen, bathroom, shop, sewing) should have separate light controls.
- ☐ Several activity areas can benefit from additional task lighting.

Additional lighting may be required for any student and, in addition, may be beneficial to the visually or physically handicapped.

Task lighting can take many forms, such as fluorescent lighting over kitchen counters or portable fixtures for sewing stations.

- ☐ Incandescent lighting is appropriate for simulating the home environment.

ACOUSTICS

Refer to Acoustics in Section 1, General Building Design Criteria, of Chapter 3.

CLIMATE

- ☐ Ventilation has to be carefully considered for such activities as cooking, laundering, grooming, woodworking, and cleaning.

Spaces accommodating these activities will require mechanical ventilation and may need teacher control for increased exhaust capability.

Some handicapped students are particularly sensitive to air quality as it relates to respiratory functions and comfort.

UTILITIES

- ☐ More than one sink is generally required in the home living skills area.

Sinks are usually related to such areas as the kitchen, bathroom, shop, and general clean-up.

- ☐ An outside water source is desirable to support activities such as planting, gardening, and lawn care.
- ☐ Home living skills require more electrical outlets than the average instructional area.

The use of equipment such as woodworking equipment, irons, vacuum cleaners, hair dryers, kitchen appliances, clothes washer and dryer, electric typewriters, and sewing machines dictates this need.

- ☐ The home living area generally requires a 220 volt power source for a clothes dryer.
- ☐ If an observation room is provided, a listening system with volume control and area pick-up selector is required.
- ☐ All controls for ovens, ranges, lights, exhaust fans, and sinks should be accessible to the physically handicapped student.

INDUSTRIAL ARTS

Industrial arts can be defined as that part of general education in which students deal experimentally with technology, its education, utilization, and significance; with industry, its organization, materials, occupations, processes, and products; and with the benefits and problems resulting from the technological and industrial nature of society.

Students participating in an industrial arts program will have opportunities to develop (a) self, related to the psychological, physiological, and sociological aspects of human development; (b) skills related to creating, problem solving, decision making, communicating, and using tools, materials, products, and processes of industry, and habits related to health and safety; and (c) interests, understandings, appreciations, and knowledge related to an industrial and technological culture.

Industrial arts and vocational/technical education are both part or subcategories of career education. The difference between them, however, is distinctive. Industrial arts education is part of the general education for all students, while vocational/technical education offers programs for students who have selected a specialized occupation and employment goals.

ACTIVITIES

The sample of activities identified can occur in industrial arts programs that are presented through such offerings as wood, ceramics, mechanical drawing, metals, graphic arts, electricity, plastics, power mechanics, leather work, textiles, construction, manufacturing, transportation, and communication.

Typical industrial arts activities include:

Use of hand tools	Assembling and building
Use of power tools (portable or fixed in place)	Smoothing
Measuring	Finishing (e.g., painting)
Reading and writing	Audiovisual presentations
Oral presentations and instruction	Individual and group projects
Cutting and shaping	Heating
Fastening and adhering	Work with models
Sewing and weaving	Work with actual equipment
Darkroom activities	Printing
	Clean-up

GENERAL GUIDELINES

- ☐ In the continuum of services, industrial arts activities can occur in the regular classroom, in specialized areas, or a combination of these two alternatives. The type and location of the program offered may be determined by studying these variables: (a) the type and level of the program, (b) the ability level of the students, (c) the number of students to be served, (d) the staffing needed, and (e) other support services available.
- ☐ Introductory or basic activities of an industrial arts nature can be easily carried out in the general classroom. As the level of sophistication of the program increases or as the student ability level increases, separate areas may be required.
- ☐ In some schools, industrial arts activities may be offered in combination with the art program and might be referred to as arts and crafts. The criteria previously cited should be used to assist in determining if this approach is appropriate.
- ☐ Specialized areas of industrial arts may be provided in many ways. They may be provided as (a) unit shops such as wood, metal, or ceramics; (b) general shops combining two or more units such as wood and metal or mechanical drawing, graphic arts, and photography; or (c) comprehensive shops such as manufacturing, communication, and transportation.

SPACE

- ☐ When basic industrial arts activities are provided in general instructional areas for handicapped students or a combination of handicapped and nonhandicapped students, there is generally no need for additional space.

This assumes that the square footage identified under General Instructional Areas has been consulted.

- ☐ Significant amounts of additional space are usually not required in specialized industrial arts instructional areas where handicapped students are served along with nonhandicapped students (see Worksheet 14).

This assumes that state department of education or national association guidelines for industrial arts programs have been followed. Where guidelines do not exist, the state department of education may be consulted.

Additional square footage may be required for circulation space (e.g., aisles, space in front of cabinets, space between work benches, space surrounding fixed equipment and safety zones) which has been planned for wheelchair users and those who require crutches, walkers, or canes to circulate and work unobstructed, freely, and safely.

The size of each shop will generally vary and is dependent upon the program to be offered, the number and disability of students to be served, the abilities of the students, staffing, and the sophistication of the program offering(s).

- ☐ Teacher planning, storage areas, finishing rooms, and project storage areas are required support spaces for the industrial arts program.
- ☐ It may be advisable to delineate areas within the shop by the arrangement of furniture and equipment. The areas of delineation may be (a) table or bench work, (b) power tools, (c) the wet area, and (d) open work space.
- ☐ A separate lecture/seminar/instructional area may be provided, or space may be provided in the shop to accommodate this need.
- ☐ A minimum ceiling height of 12 feet should be considered for most industrial arts shops.

SPATIAL RELATIONSHIPS

- ☐ Industrial arts shops should be conveniently located to the other instructional areas and the students they will serve.
- ☐ Industrial arts shops may also function as the area in which furniture and equipment are modified to meet the individual needs of handicapped students. In this case, it may be desirable to locate the shop near the physical and/or occupational therapy areas.
- ☐ Locating industrial arts in proximity to art, music, and home economics promotes teacher cooperation, clusters relatively noisy activities, and has the potential for students and teachers to share equipment and materials.
- ☐ Access to the exterior of the school for the delivery of supplies, machinery, and equipment is generally required.

WORKSHEET 14
Space Guidelines for Industrial Arts

Activity	Square foot guidelines	No. of persons or spaces involved	x	Square feet per person or per space	=	Required net square feet
Specialized industrial arts shops	1. Consult your state department of educa- tion guidelines. 2. Consult your state department of educa- tion. 3. Refer to national industrial arts space guidelines.					
			x		=	
Storage	A minimum of one space at 150 sq. ft.		x		=	
Finishing	Each space at a minimum of 100 sq. ft.		x		=	
Observation	Each space at a minimum of 50 sq. ft. or 10 sq. ft. per person.		x		=	
Lecture/ seminar	One space at a minimum of 300 sq. ft. or 20 sq. ft. per person.		x		=	
Teacher planning	A minimum of 50 sq. ft. per person.		x		=	
Other						
(Describe)			x		=	
				Total net sq. ft. required	=	

STORAGE

- ☐ The quantity and location of storage required will vary and is directly related to the program(s) offered and the instructional materials used. One storage room at 150 square feet is a minimum requirement for each specialized industrial arts program.

- ☐ The following storage within the shop area should be considered.

Open shelving: 35-200 square feet

Closed storage: 200-600 cubic feet

Counter surface: 25-80 square feet

FURNITURE

Refer to Furniture in Section 1, General Building Design Criteria of Chapter 3.

EQUIPMENT

- ☐ The equipment varies with each industrial arts program and/or offering.

- ☐ Equipment should be selected which is compatible with the program, the ability of the students, the ability of the instructor, the methods of instruction, and the number of students to be served.

- ☐ Handrails or handgrips may be of assistance to some students, particularly at work surfaces or when using power tools.

- ☐ Custom-made shop coats or aprons for students with adaptive or assistive devices (e.g., wheelchairs, walkers) to protect them while working in the shop should be considered.

DISPLAY

- ☐ Display surfaces should be accessible to handicapped students.

- ☐ The following quantities of display surface are recommended for industrial arts shops:

Chalkboard: 32-96 square feet

Tackboard: 32-64 square feet

Pegboard: 12-16 square feet

Tackstrip: 15-30 feet

- ☐ A display case for two and three dimensional projects should be accessible to handicapped students.

SURFACES

Refer to Surfaces in Section 1, General Building Design Criteria, of Chapter 3.

LIGHTING

- ☐ Task lighting at power tools may be required to assist some students, especially those with limited visual or fine motor skills.

ACOUSTICS

Refer to Acoustics in Section 1, General Building Design Criteria, of Chapter 3.

CLIMATE

- ☐ A dust collection system or individualized vacuum attachment units at each piece of power equipment should be provided in the woodworking area.

- ☐ Ventilation must be considered in all shops with particular attention to independently controlled units in kiln areas, finishing rooms, darkrooms, automotive engine areas, and other areas where fumes, odors, gases, or heat are produced.

UTILITIES

- ☐ Emergency power cutoff switches should be placed in several locations in the shop (key controlled reset).

- ☐ Some programs may find a time clock advantageous.

- ☐ The electrical requirements of each piece of equipment must be determined and then the power to be available designed to meet these needs.

- ☐ Emergency eyewashes and showers, if required for the program, should be available and usable by handicapped students.

PHYSICAL EDUCATION

Physical education is a well planned, individualized, sequential progression of experiences that contribute to (a) maintenance of a desirable level of health, fitness, and physiological function; (b) proficiency in the performance of physical activities; (c) knowledge, sense perception and judgment, memory, imagination, creative ability, thinking and reasoning, and appreciation related to performing physical activities; and (d) adjustment both to self and others and the development of desirable standards of conduct. It serves the divergent needs of all students—the gifted, the handicapped, the average—and is geared to the developmental needs of each individual.

ACTIVITIES

Typical physical education or adaptive physical education activities include:

Testing	Dancing
Relays	Scooter activities
Tumbling	Tennis
Balance stunts	Badminton
Balance beam movements	Cycling
Parallel bar movements	Bowling
Horizontal bar movements	Handball
Jumping	Volleyball
Rhythms	Hiking
Ball handling	Mobility training
Climbing rope	Swimming
Archery	Baseball
Horseshoes	Basketball
Table tennis	Soccer
Wrestling	Floor hockey
Fencing	Kickball
Tetherball	Shuffleboard
Track and field	Weight lifting
Football	Gymnastics
Golf	Exercising
Softball	Table games

GENERAL GUIDELINES

- Handicapped students are provided the opportunity to participate in all the services typically taking place in physical education. Physical education activities once considered out of the question for handicapped individuals are now suggested as providing realistic challenging opportunities for these people. Physical education activities can be a major source of achievement and personal satisfaction.

- In addition, handicapped students may be provided various modified or additional activities to meet their particular needs. Depending upon their handicapping condition, these can range from a small percentage to all of the activities of the physical education program. More often than not, these programs involve individual or small group activities. Some of the more common terms applied to these programs are adaptive physical education, corrective physical education, perceptual motor skills, and atypical programs. Whatever the program title, the possible activities range widely. It is therefore important to clearly describe a program by the activities that will take place and the characteristics of the students involved. The requirements for these activities have implications for various facilities above those typically provided, additional equipment, and additional staff. For the purposes of this discussion, the term adaptive physical education will be used to broadly describe any special physical education programs.

SPACE

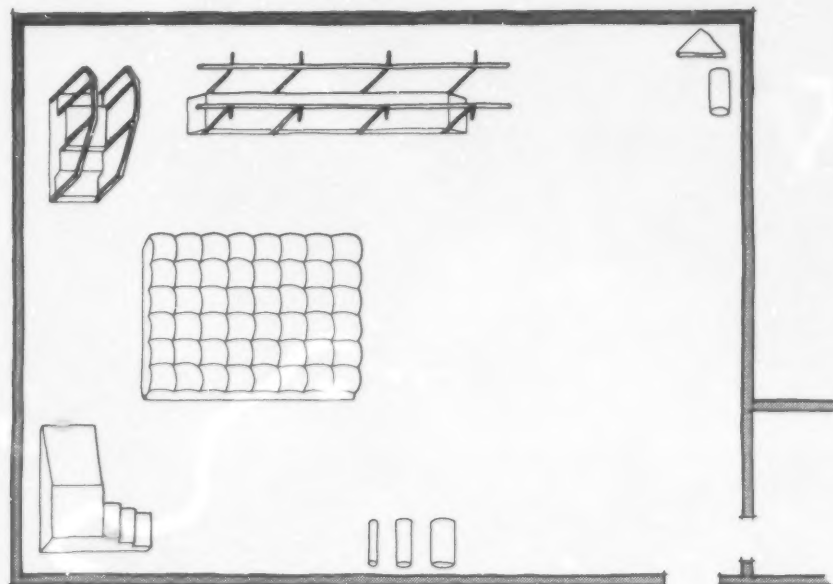
- It is important to provide some adaptive physical education activities with their own space.

A separate space allows both teacher and student to concentrate on activities without fear of disruption from other activities.

Equipment can be set up for long periods of time to accommodate specific activities such as a mobility training course or a configuration of mats and objects for strength development activities (Figure 66).

FIGURE 66

It is important to provide space where equipment can be placed for long periods of time.



These activities usually involve individuals and small groups. If the typical gymnasium space was the only activity area available, efficient use of space would not be realized and scheduling problems might arise.

- ☐ The sharing of space by physical education activities and other major activities such as food services or auditorium functions may create potential safety hazards for handicapped students. Steps leading up to a stage in a gymnasium or the doorways and other wall disruptions required in a cafeteria are two examples.
- ☐ Worksheet 15 provides space guidelines for adaptive physical education activities.

SPATIAL RELATIONSHIPS

- ☐ Many activities for adaptive physical education should occur in a separate and distinct space that is acoustically isolated from the gymnasium and other physical education areas.
- ☐ Separate adaptive physical education areas should have direct or convenient access to the gymnasium.

This will facilitate the sharing of space and equipment between programs.

- ☐ Indoor storage for the adaptive physical education program should be directly accessible to the adaptive physical education activity area(s).
- ☐ Toilet rooms that are indirectly accessible to adaptive physical education are usually acceptable. With some populations, however, direct accessibility may be required.
- ☐ Easy access to a workshop may be required when adaptive physical education equipment is to be planned and constructed or commercially available equipment is to be modified.
- ☐ If provided, a swimming/therapy pool should be conveniently located from the physical therapy area.
- ☐ Planning space for teachers involved with adaptive physical education should be combined with the planning space of other physical education staff.

This arrangement will encourage cooperative efforts between programs.

- ☐ Outdoor play areas should be directly accessible from the major physical education indoor activity areas.

STORAGE

- ☐ Indoor storage for adaptive physical education should be 100-400 square feet (refer to the discussion in Worksheet 15, Space Guidelines).

- ☐ Outdoor storage for adaptive physical education should be a minimum of 100 square feet.

This space can be combined with other outdoor storage space.

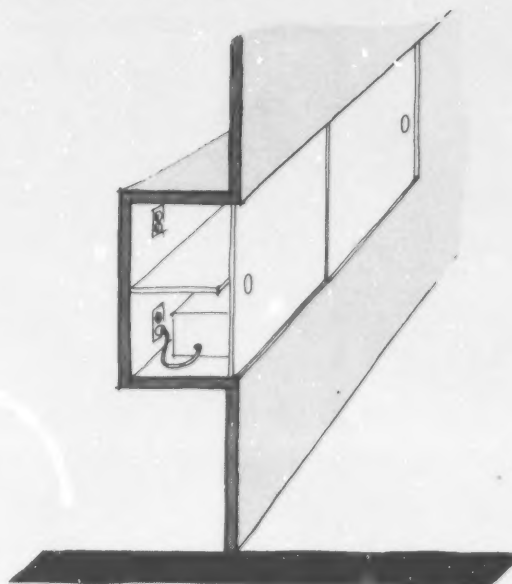
- ☐ Built-in recessed storage cabinets with electrical outlets (in a gymnasium and other activity spaces) can be useful to house record players and other equipment that is often used in physical education activities (Figure 67). Providing a recessed storage area eliminates the potential safety hazard of using equipment carts or running electrical cords on the activity floor area.
- ☐ In an area in which various games are played (e.g., power soccer, pool, puzzles, darts, and ping-pong), cabinets should be provided. This storage should be accessible to students in wheelchairs.

FURNITURE AND EQUIPMENT

- ☐ Specialized commercially available equipment, modifications to readily available equipment, and specially built items are an important aspect of providing a successful physical education program. The integration of

FIGURE 67

Recessed storage with outlets for electrical equipment eliminates some safety hazards.



WORKSHEET 15
Space Guidelines for
Adaptive Physical Education

Activity	Square foot guidelines	No. of persons or spaces involved	x	Square feet per person or per space	=	Required net square feet
Adaptive physical education	Preschool and Elementary: The activities at this age are usually quite involved and may include such activities as balancing, rhythmic work, jumping, exercising, catching and passing bean bags or balls, mobility training, strength development or posture training.					
	The space requirements are in addition to the standard gymnasium and range from 700 sq. ft. to 3,000 sq. ft. with the following variables to be considered: 1. The total number of handicapped students to be served plus their handicapping conditions and severity. 2. The maximum number of students to be served in this space at any point in time. 3. The requirement for equipment to be set up for long periods of time, such as mobility training course for wheelchair bound students.		x		=	
	Secondary: The space requirements are in addition to the standard physical educational facilities and range from 800 sq. ft. to 1,600 sq. ft. depending on the same variables considered at the preschool and elementary level.		x		=	

WORKSHEET 15 (continued)

Activity	Square foot guidelines	No. of persons or spaces involved	x	Square feet per person or per space	=	Required net square feet
Swimming/ physical therapy	Approximately 45 sq. ft./student for a therapy pool. (To this basic figure should be added space for adjacent circulation, lockers, toilets, showers, storage, water filtration and purification equipment, etc.)		x		=	
Observation	A minimum of 50 sq. ft. or 10 sq. ft./person.		x		=	
Indoor storage	The requirement for storage in support of the adaptive physical education activities will vary considerably. A minimum of one space at 100 sq. ft. should be provided. Some programs may require up to 400 sq. ft. to house large quantities of items such as balance beams, barrels, ramps, steps, mats, inner tubes, games, ping-pong tables, balls, bowling balls and plastic pins, large and small foam shapes, hoops, bicycles, and parallel bars.		x		=	
Outdoor storage	A minimum of 100 sq. ft.		x		=	
Workshop	The requirements for this space will vary considerably depending upon whether it serves other programs (e.g., art, occupational therapy, physical therapy, industrial arts) or is provided specifically for the adaptive physical education program.		x		=	
Teacher planning	A minimum of 50 sq. ft./person.		x		=	
Other (Describe)			x		=	
				Total net. sq. ft. required	=	

handicapped students into general school programs expands and diversifies the equipment needs of physical education programs.

For example, audible balls, audible goal locators, and more extensive table games may be provided for visually impaired students.

Courses may be constructed for mobility training or strength and endurance activities.

☐ **Examples of typical equipment used in adaptive physical education include:**

Piano	Deck tennis
Paddle tennis	Hockey sets
Roller skates	Horseshoes (rubber, regular)
Scoop ball sets	Ramp
Shuffleboard	Side horse
Table tennis	Turning bar
Tetherball (regular, miniature, table)	Vaulting box
Power table games	Balance beam (adjustable)
Bean bag games	Horizontal bar
Bowling game sets	Low parallel bars
Bicycles	Parallel bars
Croquet sets	Weights (assorted sizes)
Dart games (suction, regular)	Ankle and leg exerciser
Pegboard	Barbells
Assorted balls	Wall and/or floor pulleys (duplex, triplex, chest)
Camera	Whirlpool
Movie camera	Balance boards
Overhead projector	Cage balls
Phonograph	Exercise tables
Slide projector	Exercycles and/or bicycle exercisers
Tape recorder	Jump ropes
Climbing ropes	Mats
Horizontal ladder	Metronome
Mirrors (full length and/or three way)	Punching bags
Still rings	Isometric apparatus
Wall horizontal bar (adjustable)	Leg press machine or bar
Wall parallel bar	Trampoline

DISPLAY

- ☐ Each activity area (e.g., gymnasium, weight room, game room, perceptual motor skills area) requires a small quantity (16 to 32 square feet) of both chalk and tack surface.

- ☐ Portable chalk boards should be provided in meeting some of the need for chalk surface.

Portable chalk surfaces add to the flexibility of space utilization.

SURFACES

Floors

- ☐ Adaptive physical education activities require two basic types of floor surfaces: (a) a soft, warm material, such as carpet, which facilitates rolling, floor exercises, and similar activities (portable mats are useful in providing this type of floor surface when a permanent installation is not viewed as desirable); and (b) a hard surface area for activities involving scooters, court games, ball handling, jumping, and so forth.

- ☐ Any hard surface should be selected to have resilient, nonglare, and nonslip characteristics.

A synthetic floor is far superior to wood or vinyl tile in meeting these characteristics.

- ☐ In rooms housing games a sound absorbent floor surface should be considered to aid in handling the high impact sounds of the games and loud voices.

- ☐ Locker, shower, and lavatory floors should be constructed of a nonslip surface that is resistant to fungus growth and dirt collection.

- ☐ Floor surfaces in shower rooms should enable water to drain properly.

The slope should provide good drainage while minimizing the potential of slipping (generally a 1% slope).

Drains should be flush with the floor surface.

Perimeter drop-off drains should be avoided.

Walls

- ☐ The introduction of windows should be carefully considered.

Windows may cause distractions to some students and take up valuable wall surface that could otherwise be used for activities.

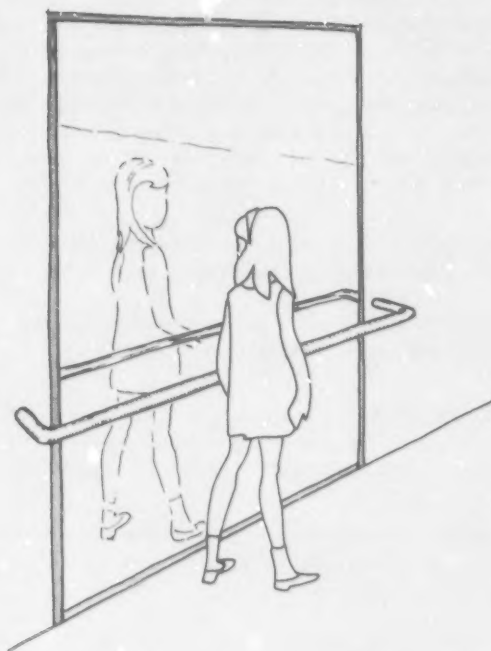
- ☐ The walls of adaptive physical education areas should accommodate the suspension of equipment such as climbing apparatus, dart boards, and tetherball.

- ☐ A built-in mirror is suggested when it is required to provide feedback to the student for body awareness and self evaluation (Figure 68).

- ☐ Wall surfaces should be disrupted with the minimum number of door openings, drinking fountains, or permanently mounted equipment. This will increase usable wall surface for physical education activities and decrease potential safety hazards.

FIGURE 88

A built in mirror is useful for body awareness and self evaluation.



- ☐ Columns and other structural elements should not project into or near where activities will occur.

Ceilings

- ☐ Ceilings should be capable of suspending equipment such as ropes and climbing equipment.
- ☐ The ceiling should be a minimum of 16 feet high for adaptive physical education programs.

LIGHTING

- ☐ Lighting fixtures should not be a source of excessive brightness or glare.

In adaptive physical education activities, students may be involved in activities that have them looking toward the ceiling. This is especially true when perceptual motor skills are involved.

- ☐ Lighting fixtures should be fitted with protective devices to avoid breakage.

ACOUSTICS

- ☐ Acoustical isolation is very important for many adaptive physical education activities.

Sudden or loud sound from adjacent activities can cause loss of concentration and possibly unwanted behavior.

- ☐ Sufficient sound absorption is especially important for populations prone to hyperactivity or disruptive behavior.
- ☐ Rooms housing games, especially electrically powered games, should provide sufficient sound absorption to deal with sounds from the games and from loud voices.

CLIMATE

Refer to Climate in Section 1, General Building Design Criteria, of Chapter 3.

UTILITIES

- ☐ Direct communication with the main office from all adaptive physical education activity areas is required, especially for emergency situations.
- ☐ Careful planning for electrical outlets will be required in game rooms for power table games and in areas used for the viewing of films and slides.
- ☐ Sinks, lavatory facilities, and lockers should be indirectly accessible to all activity areas.
- ☐ The water temperature in showers should be controlled by the professional staff.

Serious injuries can be avoided from a student mistakenly turning off the cold water instead of the hot water or from the student's inability to manipulate the controls with precision.

PRESCHOOL/ELEMENTARY MUSIC

The basic elements of music are rhythm, melody, harmony, form, tone, color, dynamics, and tempo. They are presented to students through various cycles of experiences involving singing, playing instruments, listening, movement, creative expression, and music reading.

The music program includes the development of skills, knowledge, understandings, and attitudes for personal enjoyment, expression, and musical growth in contemporary society.

A comprehensive music program gives every student the opportunities to develop his or her music potential to the fullest. Varied and flexible music experiences, geared to meet the divergent abilities, interests, and sociocultural conditions of the total school population, should be provided.

ACTIVITIES

Typical preschool/elementary music activities include:

Singing	Talking and speaking
Dancing	Reading music
Playing musical instruments	Recording voice and music
Using rhythm instruments	Echoing activities
Body movement	Writing music
Listening to music and sounds	

GENERAL GUIDELINES

- ☐ In the continuum of services, music programs can be offered in the general classroom, in a specialized area, or a combination of these two alternatives. The type and location of the program offered may be determined by studying these variables: (a) the type and level of the program, (b) the ability level of the students, (c) the number of students to be served, (d) the staffing needed, and (e) other support services needed.

SPACE

- ☐ When music programs are offered in general instructional areas for handicapped students or a combination of handicapped and nonhandicapped students, there generally is not a need for additional space.

This assumes that the square footage identified under General Instructional Areas has been consulted.

- ☐ There is not an identified need for additional space in a centralized music instructional area where handicapped students are being served along with nonhandicapped students.
- ☐ Teacher planning and storage areas are required as support spaces for the music instructional program.
- ☐ Instrument practice areas are often required.

The playing of instruments is often related to the goal of increased muscular strength, joint movement, coordination, and breath control (with the playing of wind instruments).

- ☐ An observation area is desirable.
- ☐ Music rooms that are tiered should be avoided.

Tiered areas impede access by some handicapped students.

A tiered area limits program flexibility, grouping, and in equipment and furniture arrangements.

- ☐ Space guidelines for preschool and elementary music activities are presented in Worksheet 16.

SPATIAL RELATIONSHIPS

- ☐ Music instructional areas should have convenient access to toilet rooms.
- ☐ Music instructional areas should be located to minimize acoustical interference with specialized quiet activities.
- ☐ Convenient access to a stage for student performances and practice sessions is important.
- ☐ Stage access should be provided for physically handicapped students (Figure 69).

STORAGE

- ☐ The quantity of storage required will vary and is directly related to the programs that are offered and the instructional equipment and materials that will be used. Recommended quantities of storage for the general music instructional area are:

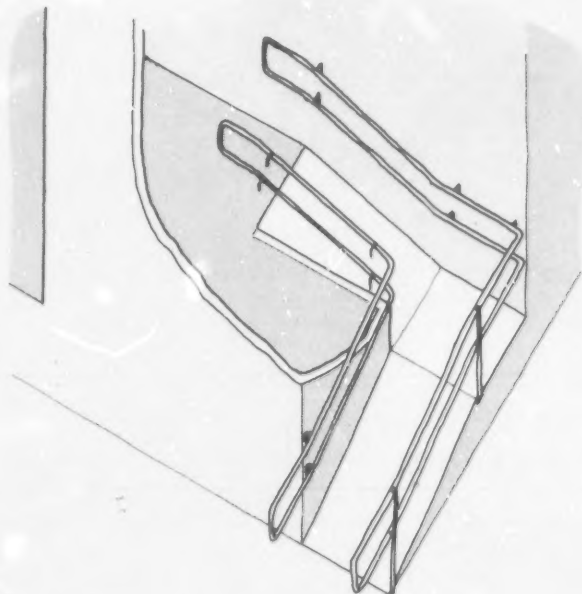
Open shelving: 30-50 square feet
 Closed storage: 220-500 cubic feet
 Counter surface: 30-50 square feet

FURNITURE

Refer to Furniture in Section 1, General Building Design Criteria, of Chapter 3.

FIGURE 69

Stage design should incorporate access for physically handicapped students.



WORKSHEET 18
Space Guidelines for Preschool
and Elementary Music

Activity	Square foot guidelines	No. of persons or spaces involved	x	Square feet per person or per space	=	Required net square feet
General music instructional area	60 sq. ft. per person for 10-12 students. For each additional student up to 20, add 25 sq. ft. per student. For each additional student up to 30, add 15 sq. ft.		x		=	
Music practice room	Each space at a minimum of 100 sq. ft.		x		=	
Storage room	A minimum of one space at 50 sq. ft.		x		=	
Observation	Each space at a minimum of 50 sq. ft. or 10 sq. ft. per person.					
Teacher planning	A minimum of 50 sq. ft. per person (possibly combined with other teacher planning space).		x		=	
Other (Describe)			x		=	
				Total net sq. ft. required	=	

EQUIPMENT

Examples of typical equipment used in preschool/elementary music include:

Piano	Record player
Musical instruments	Overhead projector
Rhythm instruments (variety of types and sizes)	Music stands

DISPLAY

- ☐ Tackboard and chalkboard should be provided in a sufficient number of locations in the room and should be readily accessible. Recommended quantities of display surface for the general music instructional area are:

Chalkboard: 60-70 square feet
Tackboard: 36-90 square feet
Tackstrip: 20-50 linear feet
Pegboard: 12-15 square feet

SURFACES**Floors**

- ☐ A combination of floor surfaces is desirable.

A hard, nonslip surface is needed for activities such as rhythm and dance and for the transmission of vibrations of instruments and recorded music for hearing impaired students.

A comfortable, warm surface is functional for such activities as sitting and body movement.

Walls and Ceilings

- ☐ There are no special requirements other than providing acoustical qualities to support the music function.

LIGHTING

Refer to Lighting in Section 1, General Building Design Criteria, of Chapter 3.

ACOUSTICS

- ☐ Special attention should be given to acoustically separating each music related area and to acoustically separating the music room(s) from other instructional areas.

- ☐ Music areas should acoustically support good speech articulation.

Some music activities relate to speech correction and conservation and auditory training.

CLIMATE

- ☐ The variety of activities such as dance and body movements requires attention to ventilation to maintain comfort levels and minimize unpleasant odors.

UTILITIES

- ☐ A sink is required when the cleaning of instruments is anticipated.

RESOURCE SERVICES

The primary goal of resource services is to provide the kind of instructional support to both the child and the teacher that makes feasible the pupil's continued enrollment in the general class and stimulates educational and emotional growth. This might take the form of direct instruction of the child in a resource room or indirect instruction through consultation with the child's teacher regarding appropriate teaching materials and management techniques (Hammill & Wiederholt, 1972).

Resource services are provided for a child on a part time and usually a regularly scheduled basis. To a large extent, resource activities occur in the general classroom. Students can also be involved in specific resource room training while remaining integrated with their friends and age mates in school. They have the advantages of a total resource program, which is prepared by the resource teacher but may be implemented in cooperation with the general class teacher. Students are the recipients of flexible scheduling in that resource services can be applied entirely in their classroom by the general teacher with some resource teacher support or in a resource room itself when necessary; also, the schedule can be quickly altered to meet the children's changing situations and needs (Hammill & Wiederholt, 1972).

ACTIVITIES

Resource room teachers are involved with a wide range of activities which, in direct teacher/student interactions, may include any or all of the services traditionally performed in self contained classes with all types and severity levels of handicapped children, for example:

Behavior modification	Social skills
Sensory skill development	Tutoring in academic subjects (math, social studies, language arts)
Motor skill development	Student counseling
Alternative reading approaches	
Language development	

In addition to teacher/student activities, the following may occur:

Parent conferences	Teacher/teacher conferences
Teacher training	

WORKSHEET 17
Space Guidelines for Resource Services

Activity	Square foot guidelines	No. of persons or spaces involved	x	Square feet per person or per space	=	Required net square feet
Main resource area	Elementary: A minimum of 250 sq. ft. for up to 3 students. For each additional student up to 15, add 60 sq. ft. per student.		x		=	
	Secondary: A minimum of 200 sq. ft. for up to 3 students. For each additional student up to 15, add 50 sq. ft. per student.		x		=	
Observation	A minimum of one space at 50 sq. ft. or 10 sq. ft. per person.		x		=	
Small resource area	A minimum of one space at 80 sq. ft.		x		=	
Teacher planning	A minimum of 50 sq. ft. per person.		x		=	
Storage	A minimum of one space at 25 sq. ft.		x		=	
Other (Describe)			x		=	
				Total net sq. ft. required	=	

SPACE

- ☐ The space requirements are dictated primarily by (a) the maximum number of students to be accommodated at one time, (b) the fact that the grouping is usually individual or small group, and (c) the probability that two or more activities frequently will occur simultaneously. Worksheet 17 presents space guidelines for resource services.
- ☐ The main resource area should be easily separated into several activity areas.

Defining space can be accomplished with low partitions and/or with various groupings and types of furniture such as carrels or tables (Figure 70).

- ☐ There may be a need for a small (around 100 square feet) adjacent space that is directly accessible to the main resource activity area.

This space can be useful as a quiet area, for testing, or for other individual or small group activities.

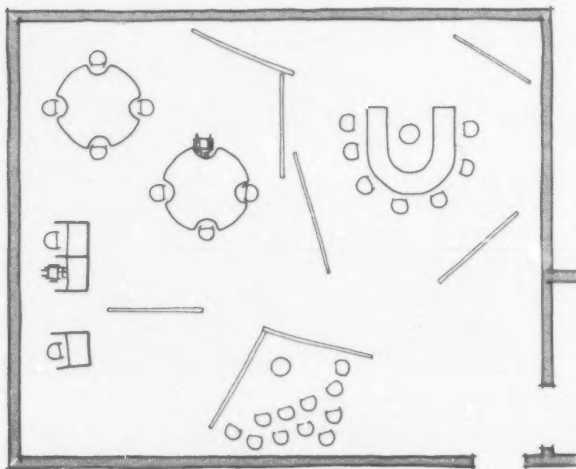
- ☐ The traffic flow must be carefully planned to allow several simultaneous activities to occur without disruptive circulation patterns.
- ☐ Sufficient space for activities to occur is important. Equally important is to avoid providing excess space for the number of students being served.

Insufficient space will inhibit the use of equipment, options for student grouping, and student mobility.

Excess space can impair the educator's ability to have adequate visual supervision and may encourage problems to occur with student concentration or behavior.

FIGURE 70

Furniture layout and partitions can divide the resource area into several activity areas.



SPATIAL RELATIONSHIPS

- ☐ Resource services should be located with convenient access to general classrooms from which students will be coming.

This will aid accessibility by students and help to minimize travel time and supervision problems.

Proximity to general classrooms will aid in coordination between the resource teacher and the general classroom teacher.

- ☐ Because of the nature of resource activities, this space should not be located adjacent to any activities that may cause the intrusion of unwanted noises, odors, and the like.
- ☐ It is desirable to have the capability of observing resource services from an adjacent space.

- ☐ Resource services should have convenient access to media services, teacher planning, and student toilet rooms.

STORAGE

- ☐ For resource services, the following storage guidelines are recommended:

Open shelving: 50-150 square feet
Closed storage: 50-100 cubic feet
Counter surface: 15-30 square feet

- ☐ An adjacent and directly accessible storage room at a minimum of 25 square feet is required.
- ☐ All shelving should be adjustable in height and provided in several widths.

Many varied sizes of instructional materials and equipment require storage.

FURNITURE

Examples of furniture used in resource services include:

Tables	Student desk
Carrels	Adult and student chairs
Pillows	Lounge seating
Equipment cart	Low portable partitions
File cabinet	

- ☐ Circular or semicircular tables are useful for many group activities (Figure 71).
- ☐ Adult stools with casters can be useful for teacher mobility (Figure 72).
- ☐ Stackable chairs can be useful in providing flexibility to the resource staff (Figure 72).

FIGURE 71

Circular or semicircular tables are useful for many group activities.

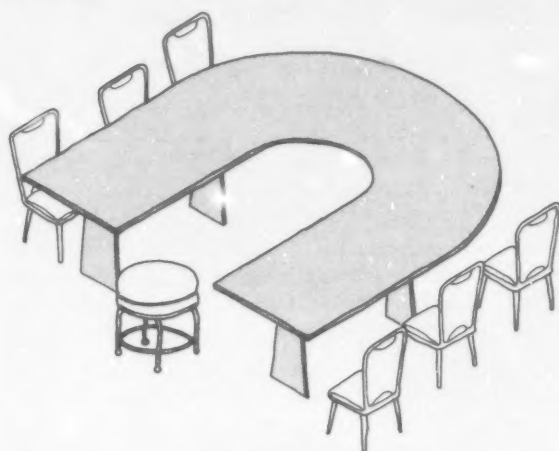


FIGURE 72

Seating can be selected to provide mobility and flexibility.



EQUIPMENT

Examples of typical equipment used in resource services include:

Tape recorder	Filmstrip projector
Cassette recorder	Auditory trainer
Language master	Overhead projector
Slide projector	Tachistoscope
Record player	Typewriter
Calculator	Assorted books
Television	Assorted puzzles
Headsets	

DISPLAY

- ☐ The availability of a variety of stimulation options through display surfaces is essential to the resource program.

- ☐ The following guidelines for display surfaces are recommended. The range in figures relates to the maximum number of students to be served at one time.

Chalk surface: 24-100 square feet
 Tack surface: 24-100 square feet
 Mirrored surface: 16-32 square feet
 Tack strip: A minimum of 20 linear feet
 Pegboard: 16-32 square feet

- ☐ Chalk surfaces should be usable by the resource staff when seated or standing.
- ☐ A mirrored surface is functional for student feedback (Figure 73).

- ☐ A small portion of the chalk and tack surface requirements should be portable (Figure 74).

- ☐ A screen for audiovisual presentations is required.

SURFACES

Floors

- ☐ The main resource area should have a floor surface of which approximately three-fourths is a warm, comfortable, sound absorbing material, with the remainder being a hard, nonslip, nonabrasive, and easily cleaned material.

The larger surface should support such activities as sitting on the floor.

The smaller surface should be associated with a sink and counter surface and should be large enough to support activities such as motor skills and painting.

Walls

Refer to Surfaces in Section 1, General Building Design Criteria, of Chapter 3.

LIGHTING

Refer to Lighting in Section 1, General Building Design Criteria, of Chapter 3.

ACOUSTICS

- ☐ The space for resource services should be acoustically separated from adjacent activities.

Activities such as testing, quiet time, listening to audiovisual presentations, and sensory skill development require an acoustically separate space.

The materials used on floors, walls, and ceilings should adequately absorb sound to minimize disturbing sound from impacts, voices, and equipment.

- ☐ Resource services should be acoustically isolated from high noise producing areas such as major hallways, the gymnasium, mechanical equipment rooms, music rooms, and playgrounds.

CLIMATE

- ☐ Space for resource services requires careful consideration of the climate.

Rooms providing resource services are often smaller in size than the average instructional area. For this reason they quickly respond to poor ventilation and high or low temperatures.

The nature of resource activities requires a high level of human comfort related to air temperature, humidity, and ventilation. Discomfort related to climate may significantly impede successful resource programs.

UTILITIES

- ☐ Direct communication with the administrative office is required.

A light signal is preferable to an auditory signal to minimize disruptions to instructional activities.

- ☐ A sink is desirable and often required.

- ☐ Toilet rooms and a drinking fountain should be within convenient access.

FIGURE 73

A mirrored surface is functional for student feedback.

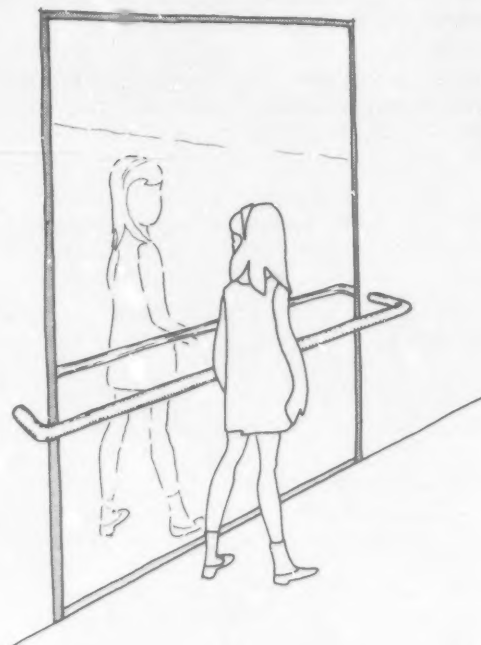
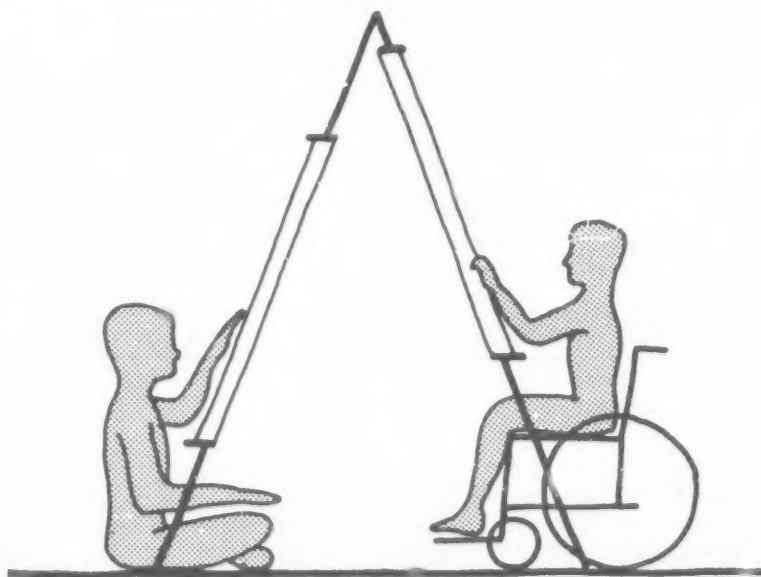


FIGURE 74

A small percentage of display surfaces should be portable.



- ☐ A television outlet is required.
- ☐ A wireless loop system for auditory amplification is necessary for hearing impaired populations.
- ☐ Teletypewriter devices are necessary with secondary level hearing impaired populations if they are part of the instructional program and/or for emergencies.
- ☐ The number of electrical outlets should allow several activities using electrically powered equipment to occur simultaneously.
- ☐ Electrical outlets should be well distributed throughout the room.

SCIENCE

The main objective of science education is the preparation of a scientifically literate adult—one who perceives and believes in the logical processes of science, who understands the natural world in which he or she lives, who has some understanding and appreciation of the interaction of science and technology, who understands the impact of science on society and of society on science, and who has the interests and attitudes necessary to study and explore science as an aid in solving personal and environmental problems. This one objective can be subdivided as follows:

1. Know the fundamental facts and principles of science.
2. Possess the abilities and skills needed to engage in the processes of science.
3. Understand the investigative nature of science.
4. Have attitudes about and appreciation of scientists, science, and the consequences of science that stem from adequate understandings.

ACTIVITIES

Specific objectives in the classroom can be classified into one of the following domains: (a) the cognitive (mental and intellectual processes of the learner), (b) the affective (appreciation, attitudes, emotions, and interests of the learner), and (c) the psychomotor (neuromuscular and physical skills).

Typical science activities include:

Reading and writing	Audiovisual presentations
Oral presentations	Preparation of materials
Demonstrations	Individual and group projects
Hands-on experimentation and investigation	
Use of scientific materials, equipment, models, and realia	

GENERAL GUIDELINES

- ☐ In the continuum of services, science programs can be offered in the general classroom, in a centralized area, or in a combination of these two alternatives. The type

and location of the program offered may be determined by studying these variables: (a) the type and level of the program that will be offered to all students, (b) the academic level or capability of the students, (c) the number of students to be served, (d) the staffing, and (e) other support services available.

- ☐ Interior courts, environmental study areas, and natural land formations on the school site should be viewed as extension and enrichment areas for the science programs. They should be designed or modified to meet the accessibility and instructional needs of the handicapped students to be served. This may require new approaches to providing physical access to outdoor instructional areas such as raised outdoor plant growth areas.

SPACE

- ☐ When preschool, elementary, and secondary science programs are offered in the general classroom, there is usually no requirement for additional classroom space.

This assumes that space guidelines for the General Instructional Area have been consulted.

- ☐ When a centralized area is planned for the delivery of science programs, which are more sophisticated and require additional specialized work surfaces, counters, tables, and equipment, then the space must be planned to meet these needs.

As the level of the program and the amount of time spent in science activities increase, space requirements tend to increase as well.

As the number of related science programs and staff increase, consideration should be given to sharing spaces that can function for more than one instructor and class or group of students, for example, preparation areas and special projects rooms.

- ☐ Provision should be made to allow for adequate movement of individuals.

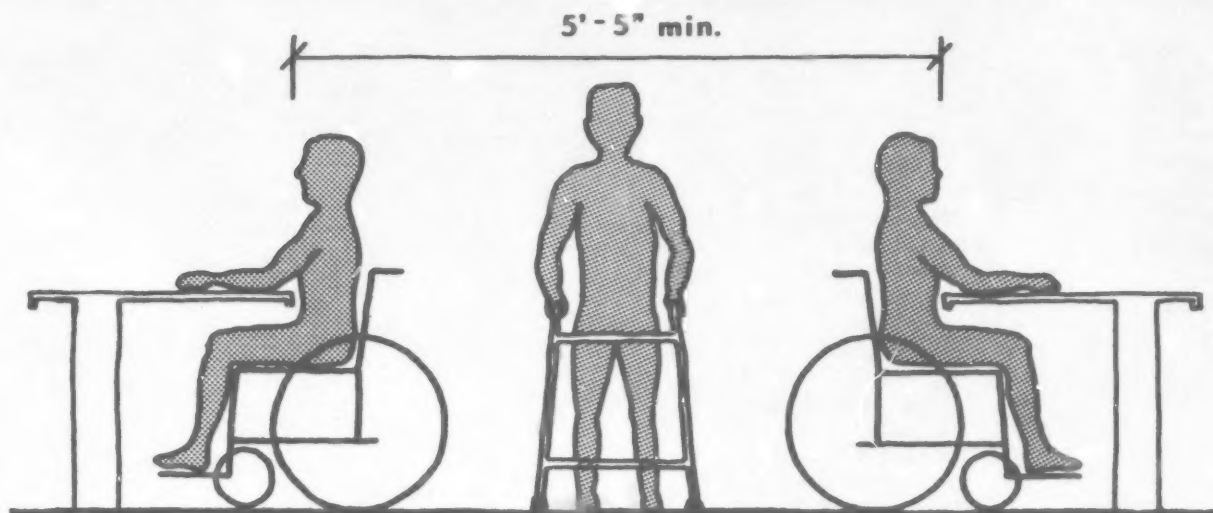
Circulation space (e.g., aisles, space in front of cabinets, space between lab tables) should be planned so that wheelchair users and those who require crutches, braces, or other assistive and adaptive devices are able to circulate throughout the science classroom and related service areas unobstructed, freely, and safely (Figure 75). This is particularly important when fixed cabinets, lab tables, and/or heavy equipment are being considered.

- ☐ Ideally, two basic instructional areas are needed for the science programs: one for nonlab work and the other for a laboratory setting.

The size of each should be planned based upon individual program needs and could also reflect the economics of shared use of some areas.

FIGURE 75

Circulation patterns must be planned for free and safe movement of students using adaptive and assistive devices.



In some cases a single instructional area could be planned that can be subdivided physically into two distinct spaces.

- ☐ The number of students for which the laboratory is designed should be carefully considered.

If the number of students to be served is too large, the ability to supervise activities and maximize safe conditions diminishes.

Science activities often involve the use of acid, hot materials, open flames, glass, and biological agents. The risk to the handicapped students' safety escalates if the laboratory is planned to serve exceedingly large groups (in excess of 28 students).

The laboratory should be designed to easily accommodate the instruction of small groups of handicapped students or a combination of handicapped and nonhandicapped students (i.e., the location of demonstration tables, chalk board, and student work stations).

- ☐ A quiet area where a student can be separated from the group while he or she regains self control may be required for some populations, such as the emotionally disturbed.

If provided, this area should be in direct view of the instructor.

This area could take the form of an alcove, an area defined by furniture, or a separate room with visual access from the classroom.

- ☐ Worksheet 18 presents space guidelines for centralized science programs.

SPATIAL RELATIONSHIPS

- ☐ The science area should have convenient access to (a) the outdoors for instructional programs and for easy and safe egress, (b) department storage, and (c) an elevator or ramps in buildings with more than one level.

- ☐ Self contained instructional areas rather than open instructional areas should be planned for science programs.

Acoustical and visual separation between instructional areas is desirable to avoid disruptions to activities and provide effective supervision of activities.

- ☐ Teacher mobility and visual control are critical for a successful program. The need for assistance and individual attention is greatly increased in special education programs and requires that teachers and aides be available and freely able to move about the room from student to student. For the same reason, all storage should be within or adjacent to the instructional area to limit the time a teacher must leave the room. Storage across the corridor, for example, is unacceptable.

STORAGE

- ☐ The quantity of storage needed is not directly related to the handicapped population being served except that provision may be required to store adaptive and assistive devices while students are in class or laboratory.
- ☐ Based on the student population, a percentage of the counters should allow wheelchair user access by mak-

WORKSHEET 18
Space Guidelines for Centralized Science

Activity	Square foot guidelines	No. of persons or spaces involved	x	Square feet per person or per space	=	Required net square feet
Lecture/ discussion	A minimum of 20 sq. ft./student. When the percentage of handicapped students exceeds 10%, refer to the square foot guidelines under General Instructional Area.		x		=	
Laboratory	A minimum of 35 sq. ft./student when handicapped students make up not more than 10% of the class enrollment. When the percentage of handicapped students exceeds 10%, the sq. ft./student should be increased accordingly.		x		=	
Individual or small group activities	A minimum of 100 sq. ft. or 30 sq. ft. per student.		x		=	
Teacher planning	A minimum of 50 sq. ft./person.		x		=	
Preparation	Each space at a minimum of 80 sq. ft. or 3 sq. ft./student.		x		=	
Central storage other than laboratory	A minimum of 50 sq. ft./teacher or 2 sq. ft. per student.		x		=	

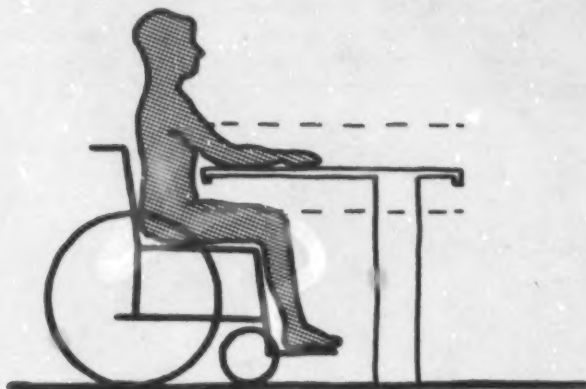
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WORKSHEET 18 (continued)

Activity	Square foot guidelines	No. of persons or spaces involved	x	Square feet per person or per space	=	Required net square feet
Plant growth	There are three basic alternatives: 1. A minimum of 400 sq. ft. for a greenhouse. 2. A minimum of 20 sq. ft./commercial growth chamber. 3. A minimum of 200 sq. ft. for a plant growth room.		x		=	
Photography	A minimum of 80 sq. ft. or 30 sq. ft. per student up to 10 students.		x		=	
Animal study	There are two basic alternatives: 1. A minimum of 20 sq. ft./commercial chamber. 2. A minimum of 150 sq. ft. for an animal study room.					
Other (Describe)			x		=	
				Total net. sq. ft. required	=	

FIGURE 76

Adjustable lab counters with unobstructed space beneath are necessary for students in wheelchairs.



ing the surface area adjustable in height and providing a free, unobstructed space beneath these designated areas (Figure 76).

- ☐ A microscope cabinet with open shelves at various heights and visual access from the front meets the needs of a wide range of handicapped students.
- ☐ The following quantities of storage are recommended for the laboratory or combination laboratory and lecture area:
 - Open shelving: 33-400 feet
 - Closed storage: 90-240 cubic feet
 - Counter surface: A minimum of 50 square feet

FURNITURE

- ☐ Chairs and/or stools adjustable to or of various heights should be provided to accommodate and meet individual student needs.
- ☐ Depending upon the population, some or all of the work tables or laboratory stations should be adjustable in height or provided at various heights to accommodate and meet individual student needs.
- ☐ Particular attention should be given to wheelchair user access by designing some or all work tables and laboratory counters that are free of storage, pipes, or other obstructions below the work surface.
- ☐ Specially configured, adjustable work surfaces may be necessary to provide access to certain equipment, such as a microscope.
- ☐ A demonstration table at a suitable height for observations and use by students in wheelchairs is needed.

- ☐ The high contrast level between science laboratory and work tables (black) and the materials used by students (white) may create eye fatigue which is a compounded problem with some handicapped students.

EQUIPMENT

- ☐ A demonstration mirror located above the demonstration table can aid some handicapped students in observation (Figure 77).
- ☐ Handrails or hand grips may be of assistance to some students, particularly at work surfaces or learning stations.
- ☐ Custom-made laboratory coats to cover students using adaptive or assistive devices should be considered.

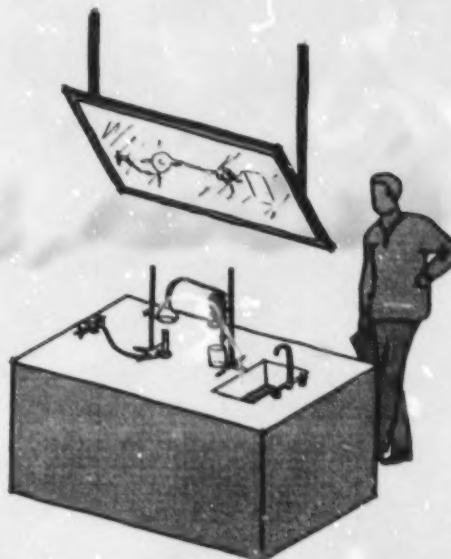
DISPLAY

- ☐ All display surfaces should be accessible to handicapped students, including those in wheelchairs.
- ☐ The following quantities of display surface are recommended for the laboratory or combination laboratory and lecture area:

Chalkboard: 64-96 square feet
 Tackboard: 32-64 square feet
 Pegboard: 12-16 square feet
 Tackstrip: 16-20 linear feet

FIGURE 77

A mirror above the demonstration table aids student observation.



SURFACES

Refer to Floors, Walls, and Ceilings in Section 1, General Building Design Criteria, of Chapter 3.

LIGHTING

Refer to Lighting in Section 1, General Building Design Criteria, of Chapter 3.

ACOUSTICS

Refer to Acoustics in Section 1, General Building Design Criteria, of Chapter 3.

CLIMATE

- ☐ Ventilation systems should be installed that will provide for the health and comfort required in the laboratory.

Some handicapped populations are very sensitive to the quality of air as it relates to respiratory function and/or comfort.

UTILITIES

- ☐ Emergency eyewashes and shower should be available and usable by handicapped students.
- ☐ Gas, air, water, and vacuum utilities should be placed so that handicapped students have easy and safe access at work tables and laboratory stations.
- ☐ Controls for gas, air, and vacuum utilities should be provided so that handicapped students have easy use of these utilities.

Lever hardware, for example, is acceptable as opposed to the typical knob control.

- ☐ Particular attention is needed for access to electrical outlets at work tables and laboratory stations.
- ☐ Switches for exhaust fans should be accessible to handicapped students.
- ☐ Emergency utility shutoff switches that are accessible to handicapped students should be provided in at least two locations in each room.

Related Services**PHYSICAL THERAPY**

Physical therapy services include the prevention of disability, restoration of function, and adaptation to permanent disability. Physical therapy provides screening, evaluation, and treatment for handicapped individuals, and it provides consultation and training to parents and to service related personnel. Additionally, equipment and environment may be adapted to maximize the functioning of the handicapped individual.

The general objectives of a physical therapy program include:

1. Screening children to determine the need for physical therapy services.
2. Evaluating children to determine an objective basis for treatment and each child's level of functioning.
3. Developing goals for treatment that are compatible with the individualized education plan.
4. Remediating according to the needs of the child.
5. Counseling parents, teachers, administrators, and other service related personnel to maximize the child's level of functioning.

6. Training parents, teachers, administrators, and other service related personnel to provide consistent total care for the child.

ACTIVITIES

Typical physical therapy activities include:

Physical therapy assessment

- Screening
- Counseling
- Evaluating (e.g., muscle tone, strength, endurance, posture analysis, respiratory function, activities of daily living)

Physical therapy treatment

- Postural exercises
- Coordination exercises
- Strength and endurance exercises
- Respiratory exercises
- Balance and equilibrium training
- Use of assistive devices (e.g., crutches, canes)
- Use of braces, twistors, and splints
- Positioning for classroom and home environment

Feeding and dressing
Toileting
Transfers
Modifying furniture and equipment
Hydrotherapy

GENERAL GUIDELINES

- ☐ In the continuum of services, physical therapy can take place (a) in a centralized location where students travel to the therapist, (b) in the student's classroom where the therapist travels to the student, or (c) a combination of the two previous alternatives. Some of the variables that determine the type of service to be provided are the total number of students to be served, the severity of handicap and relative mobility of the students to be served, and the number and type of physical therapy staff needed.
- ☐ The corridor and other circulation areas of the building should be recognized for their use in physical therapy activities. Circulation areas are frequently used to provide learning experiences for students such as climbing stairs, walking skills, the use of elevators and water fountains, the manipulation of various doors and door hardware, and the use of scooter board activities. This factor has implications for providing (a) a variety of building hardware, doors, and surfaces and (b) sufficient corridor width to accommodate these activities simultaneously with everyday circulation patterns (Figure 78).
- ☐ Physical therapy is often defined as having programmatic relationships with one or more of the following

service areas: (a) occupational therapy, (b) perceptual motor development, (c) physical education and adaptive physical education, and (d) home living skills. These services often engage students in some of the same or similar activities and frequently use the same or similar equipment. The sharing of major activity areas, storage, toilets, and other facilities may be considered. It is often advantageous for two or more of these services to share teacher planning space to encourage cooperative efforts among staff (Figure 79).

- ☐ Individual requirements for physically and multiply handicapped students dictate that standard furniture and equipment be modified. The area provided for this activity is often supervised or at least utilized frequently by the physical therapy staff.

SPACE

- ☐ The amount of space required for therapy activities should be directly related to the therapeutic furniture and equipment needs for various handicapping conditions and the number of therapists who will be working simultaneously.

Furniture and equipment is probably the single most important variable in determining the requirements for space. A careful accounting of equipment (e.g., mats, prone boards, training steps, air inflated objects, cycles) should be made to determine the items permanently placed in the therapy activity area and which items require storage space. This will avoid the storage of equipment in areas designated for therapy activities.

The number of therapists relates directly to the number of

FIGURE 78

When designing corridors, their use in physical therapy learning experiences should be considered.

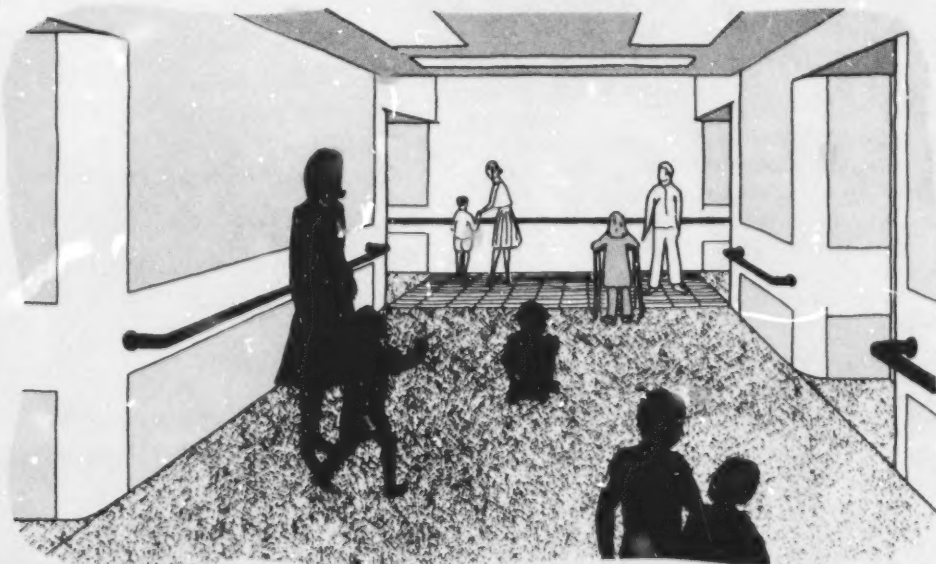
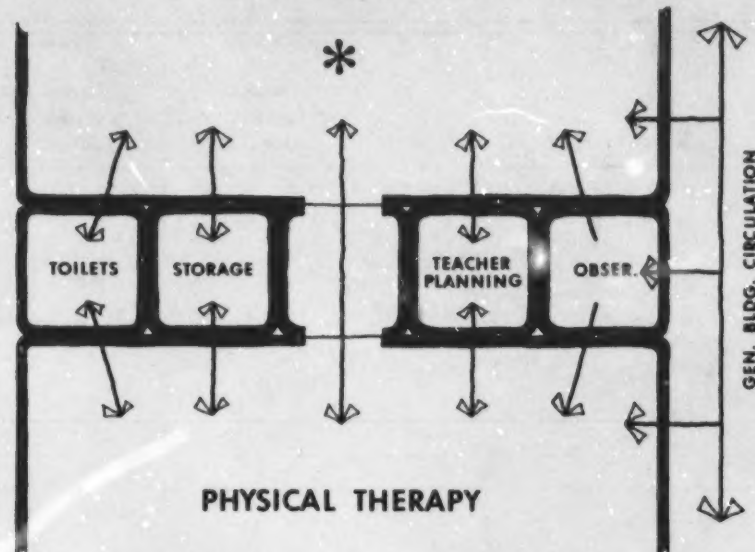


FIGURE 79

Facility sharing between physical therapy and related service areas encourages staff cooperation.



simultaneous activities that may occur and the number of students needing service.

- ☐ Space allocations should reflect the way in which services are to be delivered.

Varied programs suggest that services can be delivered in several ways: in the classroom, in a centralized location, or in the classroom and a centralized location. The guidelines presented here look at both ends of the spectrum. Space guidelines for services occurring both in the classroom and in a centralized location can also be interpreted from the guidelines.

For the itinerant physical therapist or full time physical therapist providing services primarily in the classroom, a distinct space for most physical therapy activities may be difficult to justify. However, some activities requiring specialized equipment that cannot be duplicated in each classroom (e.g., hydrotherapy) may require a distinct space. The shared use of space with other activities in the classroom may be the solution. Physical therapy may occur, for example, in support space adjacent to the classroom, such as a multiuse alcove; a special projects room shared between classrooms; or the classroom itself. The space regularly programmed for the classroom may be appropriate if only one or two students are receiving physical therapy services at a time. Additional space may be required in the classroom if many students are receiving therapy simultaneously. Also, storage requirements may need to be increased to accommodate specialized equipment and supplies.

For physical therapy activities that take place in a centralized location the majority of the time, Worksheet 19 can be used to develop the space needs for a specific program. The activities list may not be all-inclusive or defined cor-

rectly for a specific program. The worksheet is only a basis from which to begin planning space requirements.

SPATIAL RELATIONSHIPS

- ☐ Physical therapy activities may require direct access to occupational therapy and home living skills areas.
- ☐ Physical therapy activities should have convenient access to medical services and the classrooms housing the students most frequently provided physical therapy services.
- ☐ Observation should be available into the individual and group therapy testing and assessment areas without disrupting the activities taking place (Figure 80).
- ☐ The storage area for cycles should be in proximity to the outdoors.
- ☐ The individual and small group therapy area should be capable of being physically and visually divided into separate areas to accommodate simultaneous activities (Figure 81).

STORAGE

- ☐ Determination of the quantity and type of storage necessary will relate directly to the items of equipment required to support physical therapy activities.

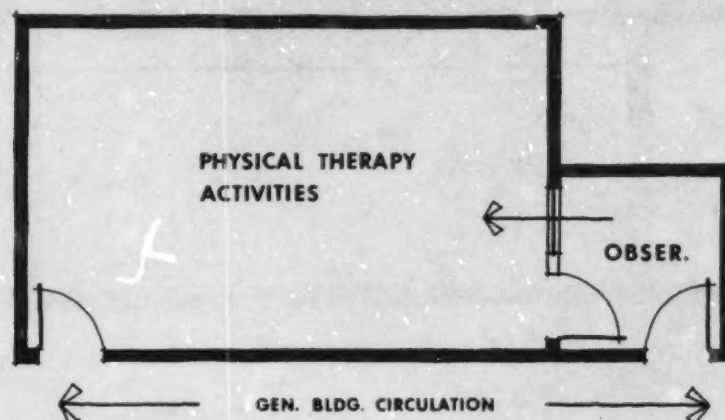
When activities take place in the classroom this area will require additional storage space.

WORKSHEET 19
Space Guidelines for
Centralized Physical Therapy

Activity	Square foot guidelines	No. of persons or spaces involved	x	Square feet per person or per space	=	Required net square feet
Individual and small group therapy	A minimum of one space at 1,400 sq. ft.		x		=	
Individual therapy, testing, and assessment	A minimum of one space at 50 sq. ft.		x		=	
Adaptive and assistive devices (casting, splinting, etc.)	A minimum of one space at 50 sq. ft.		x		=	
Hydrotherapy						
Whirlpool	A minimum of one space at 125 sq. ft. for a whirlpool activity.		x		=	
Therapy pool	Approximately 45 sq. ft./student for a therapy pool. (To this basic figure should be added space for adjacent circulation, lockers, toilets, showers, storage, water filtration and purification equipment, etc.)		x		=	
Telephone communication	A minimum of one space at 30 sq. ft.		x		=	
Teacher planning	A minimum of 50 sq. ft. per person. This space may be combined with other teacher planning space.		x		=	
Observation	A minimum of one space at 50 sq. ft. or 10 sq. ft. per person.		x		=	
Storage	A minimum of one space at 250 sq. ft.		x		=	
Furniture and equipment modification	A minimum of one space at 400 sq. ft. This space may be shared with other activities.		x		=	
Other (Describe)			x		=	
Total net. sq. ft. required					=	

FIGURE 80

Observation should be possible without having to circulate through the activity area.



For a centralized physical therapy area, the following storage guidelines are recommended:

Open shelving

Individual and small group therapy: 10 linear feet
Teacher planning: 5 linear feet

Closed storage

Individual and small group (shelving with most being 2 to 3 feet deep, built-in): 175-250 cubic feet
Hydrotherapy: 20 cubic feet
Adaptive and assistive devices: 20 cubic feet
Teacher planning: Standard desk storage plus several file drawers

Counter surface

Individual and small group: 10-20 square feet
Adaptive and assistive devices: 10-20 square feet
Hydrotherapy: 10-20 square feet

Storage Room: 250 square feet (increased if the physical therapy area is to house equipment such as walkers and wheelchairs for the entire school)

Furniture and equipment modification

Jig saw Carpentry tools
Power sander Drill press

DISPLAY

- ☐ Special requirements are not indicated when physical therapy is provided in the classroom.
- ☐ Display capabilities should be provided in a centralized physical therapy area to support staff and parent planning and training activities.

The requirement for chalkboard is minimal but necessary. The most effective provision is to supply the physical therapy areas with one or two portable chalkboards.

Tack surface is required in the individual and small group therapy areas and in the teacher planning area. Recommended quantities are:

Individual and small group therapy: 10-15 square feet
Teacher planning: 10 square feet/person

EQUIPMENT

Examples of typical equipment used in physical therapy include:

Individual and small group therapy	
Crutches	Climbing apparatus
Pillows	Typewriters
Walkers, canes, wheelchairs	Scooters
Various balls	Weight/scale
Helmets	Training steps and ramp
Tricycles	Air inflated objects
Bicycles	Sandbox
Stretcher	Horizontal bars
Large foam shapes (e.g., wedges, rolls)	Banana carts
Whirlpool	Equipment carts
Hydrocollator	Mat tables
Mats	Balance tables
Prone boards	Respiratory evaluation equipment
Portable mirror	

FIGURE 81

The physical therapy area should be divisible for simultaneous activities.

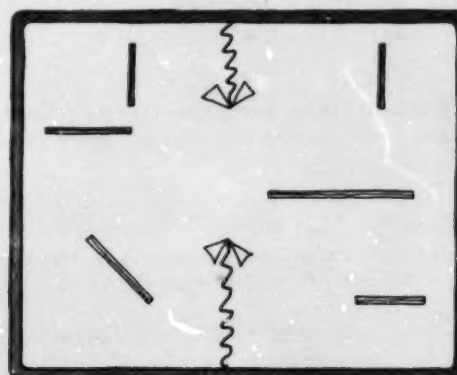
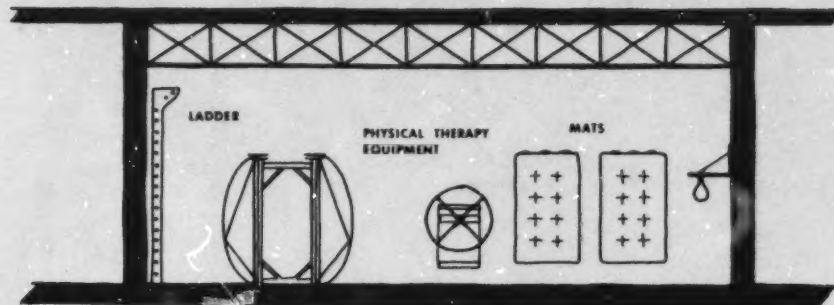


FIGURE 82

Walls in the physical therapy area can be used to attach and store equipment.



SURFACES

Floors

- ☐ The area in which most physical therapy activities are programmed should have a floor surface of which one-third to one-half is a warm, resilient material, with the remainder being a dense, nonslip, nonabrasive, and easily cleaned material.

The more resilient surface, such as carpet, will provide comfort and safety for floor activities.

If carpet is used, it should have a backing or padding to provide a degree of comfort. Carpet should also be selected to resist staining, especially in consideration of toilet accidents.

The dense surface can be vinyl asbestos tile or sheet vinyl.

Mats can be used to further modify the floor surface for increased comfort and safety.

Walls

- ☐ Walls should not cause injury to the student.
- ☐ Walls should provide the capability for attaching or hanging various pieces of equipment.

Equipment such as hammocks, tetherball, and climbing apparatus are often attached to the wall surface (Figure 82).

Equipment such as mats and prone boards can be efficiently stored on the wall surface (Figure 82).

- ☐ Walls should not be easily damaged by wheelchairs, walkers, canes, or other assistive or adaptive devices.

Ceilings

- ☐ Ceilings should provide the capability for attaching and supporting various pieces of equipment.

Hammocks, balls, climbing ropes, hoists, and tetherball are often attached to the ceiling surface.

The structural elements in or above the ceiling should provide sufficient locations for attachment to allow for program flexibility.

LIGHTING

- ☐ Lighting fixtures should not be a source of excessive brightness or glare.

Many activities occur on the floor with students having to look directly toward light sources.

- ☐ Lighting design should provide multiple switching for lighting zones in a centralized physical therapy service area.

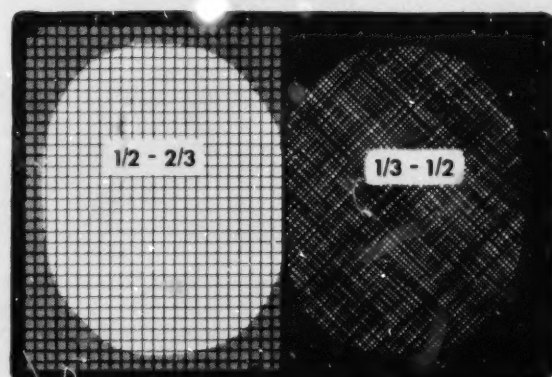
Simultaneous activities are frequent in centralized physical therapy areas because activities tend to be individual or small group in nature.

There should be a minimum of two lighting zones.

Lighting zones should coincide with different floor surface materials where they are provided (Figure 83).

FIGURE 83

A minimum of two lighting zones, corresponding to different floor zones, should be provided.



- ☐ **Lighting levels should take into consideration that a large percentage of activities take place on or near the floor surface.**

Most lighting level standards relate to work surface (desk) level.

ACOUSTICS

Refer to Acoustics in Section 1, General Building Design Criteria, of Chapter 3.

CLIMATE

- ☐ **A comfortable climate should be maintained on and near the floor surface.**

A large percentage of activities occur on or near the floor surface.

The air temperature must accommodate students who are undressed for a particular activity and students who respond to cold temperatures by tightening their muscles.

Drafts should be avoided.

Ventilation should take into consideration odors due to toileting accidents and physical activities.

UTILITIES

- ☐ **Special requirements are not indicated when physical therapy is provided in the classroom.**
- ☐ **Specific utility requirements should be considered to carry out physical therapy activities.**

Utility sinks and related counter surface are required to support individual and small group therapy, hydrotherapy (whirlpool), and activities involving adaptive and assistive devices. Sinks should be accessible by individuals using wheelchairs.

Direct voice communication to the administration office is required from individual and small group therapy, hydrotherapy (whirlpool), and teacher planning areas. This may be deleted from a testing and assessment area to avoid disruptions. A signal light indicating all incoming calls may be more advisable than an auditory signal in order to limit disruptions to activities.

Toilets should be conveniently accessible and may be required adjacent to the area if toileting is an important part of the instructional program.

A telephone for outside calls should be conveniently available and may be required directly accessible to the therapy area.

A telephone should be conveniently located and offer privacy to the physical therapy staff for contacting parents, educators, and people in the medical profession.

OCCUPATIONAL THERAPY

Occupational therapy is intended to (a) improve, develop, or restore functions impaired or lost; (b) improve the student's ability to perform tasks for independent functioning; and (c) prevent, through early intervention, initial or further impairment or loss of function. The occupational therapist provides services to students and serves as a consultant with parents, teachers, school administrators, and other educational personnel. Occupational therapy primarily focuses upon fine motor skills, sensory motor skills, and improved neuromuscular functioning. The program may also be involved in designing or constructing adaptive equipment and devices. The general objectives of an occupational therapy program within a school system include:

1. Identification of sensory motor and resulting functional behaviors contributing to physical, emotional, social, developmental, and/or learning problems of children.
2. Use of the individualized education plan concept for developing prescriptive and management programs designed to meet the special needs of each student.
3. Implementation of the planned programs to help handicapped children achieve their maximum potential with functional behaviors by providing direct services with students.
4. Integration of occupational therapy remediation and compensation techniques into classroom curricula by providing consultative services with teachers and other specialists within the school setting.
5. Appropriate training with home care through parent education and counseling.
6. Documentation of children's progress as measured by occupation evaluations and reported with the individualized education plan (American Occupational Therapy Association, in press).

ACTIVITIES

Typical occupational therapy activities involve a variety of skills.

Independent living and daily living skills: The skill and performance of physical and psychological/emotional self care, work, and play/leisure activities to a level of independence appropriate to age, life-space, and disability. Life-space refers to an individual's cultural background, value orientation, and physical and social environment.

Bathing	Nutritional planning
Toileting	Cleaning
Hair care	Laundering
Shaving	Household repairing
Applying make-up	Cooking
Feeding and eating	Ironing
Dressing	Sewing
Transfers from wheelchair	Weaving
General wheelchair mobility	Typing
Painting	Woodworking

Sensory motor components: The skill and performance of patterns of sensory and motor behavior that are prerequisites to self care, work, and play/leisure performance.

Strength and endurance activities	Postural balance
Activities for using the maximum span of joint movement	Identification and differentiation of sounds
Visual tracking	Tasting
	Smelling
	Right-left discrimination

Cognitive components: The skill and performance of the mental processes necessary to know or apprehend by understanding.

Comprehending oneself in an environment with regard to time, place, and person	Concentrating on a task or concept
	Problem solving

Psychological components: The skill and performance in self management, dyadic, and group interaction.

Experiencing and recognizing a range of emotions	Observing behavior
Writing and speaking skills	Imitating new behavior

Therapeutic adaptations: The design and/or restructuring of the physical environment to assist self care, work, and play/leisure performance.

Fitting and fabricating furniture and equipment	Repairing and modifying furniture and equipment
---	---

Prevention: The skill and performance in minimizing debilitation.

Energy conservation skills	Body-part positioning
Applying principles or procedures to minimize stress on joints	

GENERAL GUIDELINES

- ☐ In the continuum of services, occupational therapy can take place in a centralized location where students travel to the therapist, in the student's classroom where the therapist travels to the student, or in a combination of the two alternatives. Some of the variables that determine the type of service to be provided are the total number of students to be served, the severity of handicap and relative mobility of the students to be served, and the number and type of occupational therapy staff needed.
- ☐ Occupational therapists provide services with children in all age groups from 0 to 21. Respectively, the 3 to 6 and 6 to 9 age groups have the largest numbers being served. Although the upper age groups comprise a small number receiving occupational therapy services, this may increase in the next several years. The occupational therapist may be more involved with services related to prevocational skills and career development in secondary education.

☐ The five primary roles for a school based therapist in the provision of services for handicapped children include:

1. Evaluating and screening children with a variety of health care problems to specify the need for goals of an occupational therapy intervention program.
2. Participating in education program planning for individual students to coordinate occupational therapy goals and program plans with the total educational program.
3. Implementing appropriate intervention programs to facilitate the individual's optimum functioning and enhance the person's abilities to learn and develop.
4. Managing and supervising the school based occupational therapy program.
5. Consulting with school personnel and parents regarding the services provided by occupational therapy (American Occupational Therapy Association, in press).

☐ Occupational therapy often has programmatic relationships with one or more of the following service areas: physical therapy, art, physical education and adaptive physical education, home living skills, and prevocational skills. These services often engage students in some of the same or similar activities and frequently use the same or similar equipment. The sharing of major activity areas, storage, toilets, and other facilities may be considered. It is often advantageous for two or more of these services to share teacher planning space to encourage cooperative efforts among staff.

SPACE

☐ Space allocations should reflect the way in which services are to be delivered.

Varied programs suggest that services can be delivered in several ways: in the classroom, in a centralized location, or in the classroom and a centralized location. The guidelines presented here look at both ends of the spectrum. Space guidelines for services occurring both in the classroom and a centralized location can also be interpreted from the guidelines.

For the itinerant occupational therapist or the full time occupational therapist providing services primarily in the classroom, a distinct space for most occupational therapy activities may not be required. The shared use of space with other activities in the classroom is often acceptable. Occupational therapy may occur, for example, in a space adjacent to the classroom such as a multiuse alcove, in a special projects room shared between classrooms; or in the classroom itself. (The space regularly programmed for the classroom may be appropriate if only one or two students are receiving occupational therapy services at one time. Additional space may be required in the classroom if many students are receiving therapy simultaneously. Also, storage requirements may need to be increased to accommodate equipment and supplies.) Occupational

therapy may also occur in other specialized spaces, such as the home living skills, industrial arts, or art areas.

- Space guidelines for centralized occupational therapy activities are presented in Worksheet 20.

SPATIAL RELATIONSHIPS

- The main therapy area should have direct access to the kitchen, prevocational/shop, grooming/dressing, adaptive assistive devices, teacher planning, observation, and storage areas.
- Occupational therapy activities may require direct access to the physical therapy area to facilitate cooperative activities and the sharing of equipment (Figure 84).
- Occupational therapy should have convenient access to health services, speech therapy, psychological services, and the classrooms housing the students most frequently provided occupational therapy.
- Observation into the therapy area should be available without having to disrupt the activities taking place.

Direct access from the corridor to the observation room is necessary (Figure 84).

- Teacher planning areas for occupational therapy and physical therapy may be combined to encourage staff interaction and cooperation (Figure 84).

- An area appropriate for designing and/or constructing adaptive furniture, equipment, and devices may be required adjacent to convenient to the occupational therapy area.

This function is often included in the occupational therapy program. The relative accessibility—direct versus convenient—is dependent upon whether this is a primary or secondary function of the occupational therapy program.

- A telephone should be conveniently located which offers privacy to the occupational therapist for contacting parents, educators, and people in the medical profession.

STORAGE

- The determination of the quantity and type of storage necessary will relate to the items of equipment required to support the occupational therapy activities.

When activities take place in the classroom this area will require additional storage.

For a centralized occupational therapy area the following storage guidelines are recommended for the main therapy area: (Insufficient data were collected to present guidelines for the other areas in occupational therapy.)

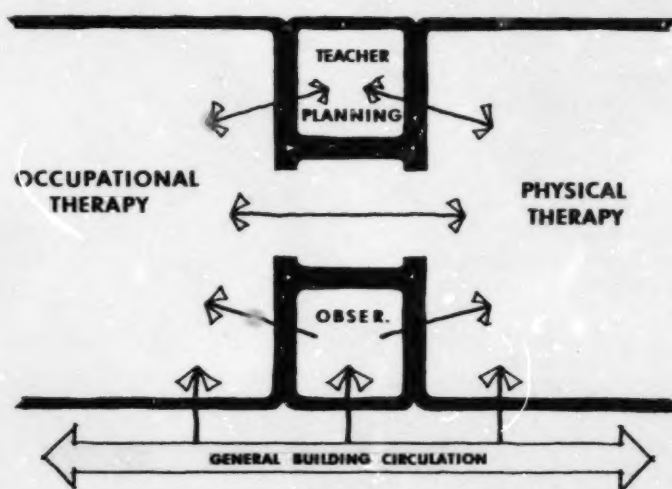
Open shelving: 40-70 square feet

Closed storage: A minimum of 200 cubic feet

Storage room: A minimum of 200-300 square feet (increased if the occupational therapy area is to house equipment for the entire school)

FIGURE 84

Direct access between occupational and physical therapy areas and shared teacher planning can encourage staff interaction.



WORKSHEET 20
Space Guidelines for Centralized
Occupational Therapy

Activity	Square foot guidelines	No. of persons or spaces involved	x	Square feet per person or per space	=	Required net square feet
Main therapy area (individual and small group activities such as typing, sewing, and crafts)	A minimum of one space at 1,000 sq. ft.		x		=	
Kitchen/dining (individual and small group activities such as eating, cooking, and cleaning)	A minimum of one space at 250 sq. ft.		x		=	
Prevocational shop (activities such as woodworking)	A minimum of one space at 300 sq. ft. (can accommodate one adult and up to three students).		x		=	
Grooming and dressing	A minimum of one space at 200 sq. ft.		x		=	
Teacher planning	A minimum of 50 sq. ft. per person. This space may be combined with other teacher planning space.		x		=	
Storage room	The space requirements for this area are too variable to generalize. To determine the require- ments, first develop a list of equipment and supplies to be stored. One major question is if the occupational therapy staff is responsible for the inventory, distribution, and storage of the school's adaptive and assistive devices such as wheel- chairs, helmets, canes, and walkers.		x		=	
Observation	A minimum of one space at 50 sq. ft. or 10 sq. ft. per person.		x		=	
Telephone communication	A minimum of one space at 30 sq. ft.		x		=	7

WORKSHEET 20 (continued)

Activity	Square foot guidelines	No. of persons or spaces involved	x	Square feet per person or per space	=	Required net square feet
Design and construction of adaptive and assistive devices	A minimum of 50 sq. ft.		x		=	
Furniture and equipment modification and adaptation	A minimum of one space at 400 sq. ft. This space may be shared with other activities such as industrial arts, art, or physical therapy.		x		=	
Other (Describe)			x		=	
				Total net. sq. ft. required	=	

FURNITURE

- ☐ Examples of furniture used in occupational therapy include:

Main therapy area

Cutout table
Standup table
Mat table
Standard and adapted student chairs and desks
Standard bed
Adult chairs
Standard adjustable table
Typewriter table
Low stools with casters

Kitchen

High chairs
Standup tables
Standard or cutout table
Standard and adapted student chairs
Adult chairs

Prevocational/shop

Work tables
Student chairs

Grooming and dressing

Dressing table
Adult chairs
Student chairs

Teacher planning

Desk
Chair
File cabinets

Kitchen

Refrigerator
Range
Oven
Hot plate
Miscellaneous cooking supplies
Mirror

Prevocational/shop

Hand saws
Hammers
Electric jig saw
Miscellaneous small hand tools
Vices
Clamps
Lathe
Electric polisher/buffer
Hand sander
Vacuum cleaner

Grooming and dressing

Mats
Mirrors, portable and wall mounted
Hair dryers
Miscellaneous grooming items

- ☐ Equipment needs are a major design factor affecting the quantity of space and types of storage required.

EQUIPMENT

- ☐ The individuality of handicapping conditions indicates the necessity for a full complement of equipment. Examples of typical equipment used in occupational therapy include:

Main therapy area

Sewing machine	Prone boards
Mats	Parallel bars
Weaving loom	Training steps
Leathercraft tools	Balance beam
and equipment	Iron
Small trampoline	Brooms
Audio equipment	Typewriters
Testing materials	Kin
Tape recorder	Balls
Equipment cart	Toys
Developmental games	Portable and wall
Foot placement ladder	mounted mirrors
Wedge and bolster pillows	Record player
Tricycle	Radio

DISPLAY

- ☐ Special requirements are not indicated when occupational therapy occurs in the classroom.
- ☐ Display capabilities should be provided for a centralized occupational therapy area. The following quantities of chalk and tack surface are recommended.

Chalk surface

Main therapy area: 24-64 square feet
Kitchen: 16-24 square feet
Prevocational/shop: 24-32 square feet
Grooming and dressing: 16-24 square feet
Teacher planning: A minimum of 24 square feet

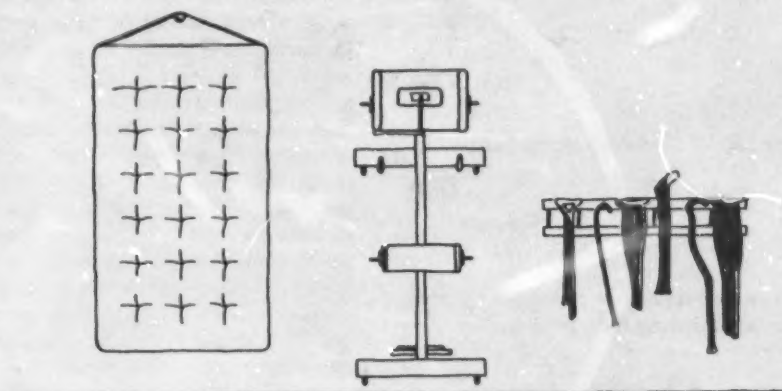
Tack surface

Main therapy area: 16-32 square feet
Kitchen: 16-32 square feet
Prevocational/shop: 16-24 square feet
Grooming and dressing: 16-24 square feet
Teacher planning: 10 square feet/person
Observation: 5-10 square feet
Telephone communication: 5-10 square feet

- ☐ Some portion of the requirements for chalk and tack surfaces should be portable for added flexibility.

FIGURE 85

Equipment such as mats and prone boards can be stored on the wall surface.



SURFACES

Floors

- ☐ The main therapy activity area should have a floor primarily surfaced with a dense, nonslip, easily cleaned material.
- ☐ The main therapy activity area should also have an area with a warm, resilient surface to provide comfort and safety for floor activities.

Carpet is an acceptable material, and mats can be used for increased comfort and safety.
- ☐ The kitchen and prevocational/shop activity areas should have a dense, nonslip, easily cleaned surface.
- ☐ The grooming and dressing activity area should primarily have a warm, somewhat resilient surface such as carpet, with a dense, nonslip, easily cleaned surface around utility areas such as sinks and toilets.

Walls

- ☐ A portion of the wall surface in the main therapy area may be required for activities such as visual tracking or motor skills such as ball bouncing.
- ☐ Walls in the main therapy area should provide the capability of hanging or attaching various pieces of equipment.

Equipment such as mats and prone boards can be efficiently stored on the wall surface (Figure 85).
- ☐ Walls should not be easily damaged by wheelchairs, canes, or other assistive or adaptive devices.

- ☐ Providing a variety of wall surface materials can serve as an instructional resource for student activities.

- ☐ The wall surface in the kitchen activity area should resist permanent damage from typical food preparation activities.

Ceilings

- ☐ Ceilings in the main therapy activity area should provide the capability for attaching or supporting various pieces of equipment.

Slings, hoists, balls, and other equipment are often attached from the ceiling surface.

The structural elements in or above the ceiling should provide sufficient locations for attachment to allow for program flexibility.

LIGHTING

- ☐ Lighting fixtures should not be a source of excessive brightness or glare.

Some activities occur on the floor with students having to look directly toward light sources.

- ☐ Lighting design should provide multiple switching for lighting zones in the main therapy area.

Simultaneous activities are frequent in occupational therapy because activities tend to be individual or small group in nature.

There should be a minimum of two lighting zones.

Lighting zones should coincide with different floor surface materials where they are provided.

- ☐ Lighting levels should take into consideration that some activities take place on or near the floor surface.

Most lighting level standards relate to work surface (desk) level.

ACOUSTICS

Refer to Acoustics in Section 1, General Building Design Criteria, of Chapter 3.

CLIMATE

- ☐ A comfortable climate should be maintained on and near the floor surface in the main therapy area.

Many occupational therapy activities occur on or near the floor surface.

Drafts should be avoided.

The air temperature must accommodate students who are undressed for a particular activity and students who respond to cold temperatures by tightening their muscles.

- ☐ The design of the ventilation system should specifically consider odors, dust, and fumes due to food preparation, cooking, painting, spraying, toileting, and woodworking.

UTILITIES

- ☐ The number and spacing of electrical outlets should consider the large quantities of power equipment used in occupational therapy activities such as typewriters, sewing machines, drills, jig saws, soldering irons, hot plates, irons, kins, tape recorders, record player, radio, refrigerator, stove, oven, and electric can opener.
- ☐ A sink is generally required in each of the following activity areas: kitchen, prevocational/shop, main therapy area, and grooming and dressing.
- ☐ A telephone for contacting parents, educators, and people in the medical profession should be conveniently located and may be required directly accessible to the therapy area.
- ☐ Direct voice communication to the administrative office is required from each district therapy area.

It may be advisable to delete this from testing and assessment areas to avoid disruptions.

A signal light indicating an incoming call may be more advisable than an auditory signal. This will minimize disruptions to activities.

SPEECH-LANGUAGE PATHOLOGY

Speech-language pathology is a service that identifies children with speech or language disorders; assesses and diagnoses specific speech or language disorders; makes referral for medical or other professional attention necessary for the habilitation of speech or language disorders; provides speech and language services for the habilitation or prevention of communicative disorders; and counsels and gives guidance to parents, children, and teachers regarding speech and language disorders. The evaluation and treatment of students generally involves articulation, voice, rhythm, language, and auditory discrimination. The speech-language pathologist provides services in both individual and group activities. The speech-language pathologist is involved in the development of individualized education programs for students and has frequent contact with parents, other special educators, regular classroom teachers, and people in the medical profession.

ACTIVITIES

Typical speech-language pathology activities include:

Screening	Record keeping
Observation	Parent conferences
Assessment	Teacher/teacher conferences
Tutoring	
Case selection and scheduling	

SPACE

- ☐ Worksheet 21 presents guidelines for speech-language pathology services.

SPATIAL RELATIONSHIPS

- ☐ Speech-language pathology areas should have convenient access to all classroom areas and generally be centrally located in the building.

Convenient access to classrooms will aid communication and coordination between the speech-language pathologist and teacher.

- ☐ If a choice has to be made, speech-language pathology should be in proximity to classrooms serving the younger students of the total population.
- ☐ Speech-language pathology should be located away from high noise producing areas.
- ☐ In some facilities for the physically handicapped it has been found desirable to locate the speech-language pathology area adjacent to the physical therapy area. Frequently, both specialists work with a child at the same time.

WORKSHEET 21
Space Guidelines for
Speech-Language Pathology Services

Activity	Square foot guidelines	No. of persons or spaces involved	x	Square feet per person or per space	=	Required net square feet
Main speech-language pathology area	A minimum of one space at 200 sq. ft. for 1 to 4 students and 50 sq. ft. for each additional student up to 10.		x		=	
Teacher planning and record keeping	A minimum of one space at 100 sq. ft. or 50 sq. ft. per person. This space can be combined with other teacher planning space.		x		=	
Individual speech-language pathology and testing	A minimum of one space at 80 sq. ft.		x		=	
Observation	A minimum of one space at 50 sq. ft. or 10 sq. ft. per person. This activity could be accommodated in the individual speech-language pathology/testing space.		x		=	
Storage	A minimum of 25 sq. ft.		x		=	
Other (Describe)			x		=	
				Total net sq. ft. required	=	

- ☐ Each full time speech-language pathologist should have more than one activity area available, which are adjacent and directly accessible to each other.

This will accommodate simultaneous activities such as:

1. Parent observation and speech-language pathology.
2. Speech-language pathologist with student and an aide with other student(s).
3. Speech-language pathology and testing.

- ☐ Teacher planning should be provided in a separate space from the speech-language pathology area.

This avoids the potential conflict of simultaneously occurring activities.

- ☐ The storage room should be directly accessible to the main speech-language pathology area.
- ☐ Storage of materials for two or more speech-language pathologists must be accessible to all pathologists without passing through a speech-language pathology activity area.
- ☐ Observation from an adjacent space is desirable without having to enter the speech-language pathology activity area.

STORAGE

- ☐ The following quantities of storage are recommended:

Main speech-language pathology area

Open shelving: 20-30 square feet

Closed storage: 40-80 cubic feet

Individual speech-language pathology and testing area

Open shelving: A minimum of 10 square feet

Closed storage: A minimum of 36 cubic feet

- ☐ The shelving requirements should be a combination of a standard depth (about 12 inches) and shelves of 18 to 30 inches deep.

- ☐ Each speech-language pathologist should be provided with a file cabinet for record keeping.

- ☐ Counter surface is generally not required.

- ☐ A storage room that is directly accessible to the main speech-language pathology area is required.

FURNITURE

- ☐ Furniture should be adjustable in height to serve the wide range of handicapping conditions and ages of students.

- ☐ Examples of furniture used in the main speech-language pathology area include:

Carrel(s)

Adult and student chairs

Table(s)

Low portable partitions

- ☐ Chairs that are stackable are preferred since they can be available quickly but stored efficiently when they are not required.

- ☐ Circular and semicircular tables are functional for many group activities (Figure 86).

EQUIPMENT

Equipment used in speech-language pathology varies considerably depending upon the handicapping condition(s), severity, and age of the students being served. Examples of typical equipment used in speech-language pathology include:

FIGURE 86

A circular table with cutouts will serve many group activities.

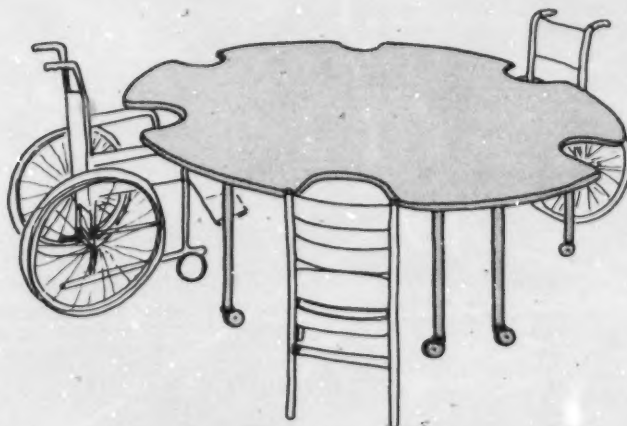
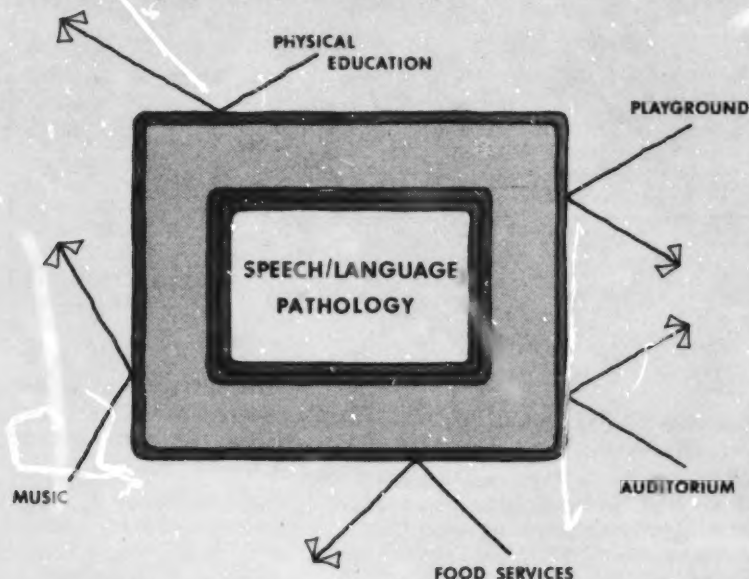


FIGURE 87

Acoustic isolation can be achieved through room location.



Learning machines (e.g., language master, phonic mirror)
Reel to reel tape recorder
Cassette tape recorders
Record player(s)
Filmstrip projector
Portable mirrors
Typewriter(s) (modified for use with orthopedic handicaps)

Overhead projector
Auditory trainers
Talking table(s) for severely and profoundly handicapped students
Film projector
Portable chalk or tack surfaces

and texture to accommodate activities that take place on the floor (especially with younger students).

Floor mats and carpeting or a combination of both are acceptable alternatives.

DISPLAY

- ☐ The following quantities of display surfaces are recommended:

Main speech-language pathology area

Chalk surface: 16-32 square feet

Tack surface: 16-32 square feet

Mirrored surface (wall mounted): A minimum of 8 square feet

Tack strip: A minimum of 10 linear feet

Pegboard: A minimum of 8 square feet

Individual speech-language pathology and testing area

Chalk surface: A minimum of 16 square feet

Tack surface: A minimum of 16 square feet

Mirrored surface: A minimum of 8 square feet

Walls

- ☐ A portion of the wall in the main speech-language pathology area should have a mirrored surface extending from just above floor level to approximately 5 feet.
- ☐ A projection surface for audiovisual presentations is required.

LIGHTING

- ☐ There should be the ability to darken the speech-language pathology area for audiovisual presentations.
- ☐ The introduction of natural light should be carefully studied.

Because the speech-language pathology area tends to be smaller in size than the average instructional area, the effective elimination of natural light to darken the room for audiovisual presentations is a more difficult design problem.

In a smaller space, visual access to the outdoors presents potential distractions unless the window is carefully located and has good shading devices.

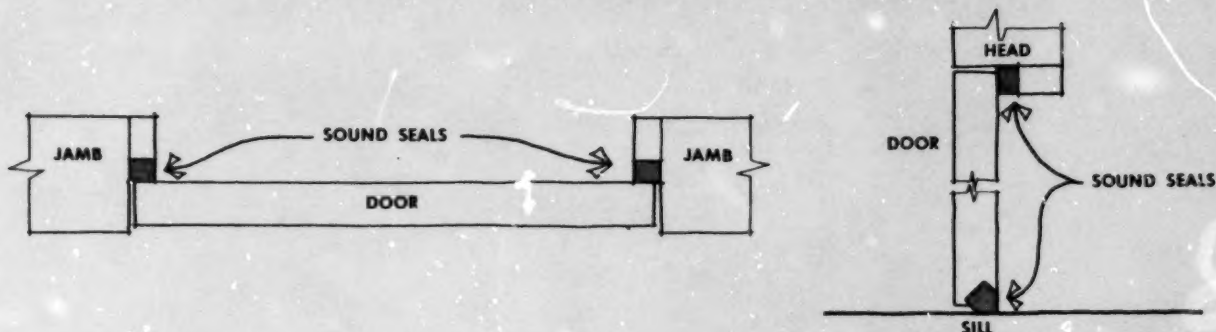
SURFACES

Floors

- ☐ The floor surface in the main speech-language pathology area should be comfortable in temperature

FIGURE 88

Special sealing devices on doors enhance acoustic separation.



ACOUSTICS

The acoustical environment is a crucial variable to be considered in designing the speech-language pathology area. Activities such as aural rehabilitation and language development rely on an environment where isolated phonetic elements and concepts must be identified and repeated. Unwanted sound or poor reverberation can significantly interfere with speech-language pathology activities and may deter student success.

- ☐ The speech-language pathology area should be acoustically isolated from high noise producing areas such as playgrounds, music, food services, auditoriums, and physical education.

This can be achieved in several ways such as (a) the location of the speech-language pathology area in the building, shown in Figure 87; (b) doors that have special sealing devices against the floor and jamb, illustrated in Figure 88; or (c) a vestibule entrance to the speech-language pathology area, as shown in Figure 89.

- ☐ Mechanical systems (heating, cooling, and ventilating) should be designed and equipment located so as not to interfere with low frequency speech, hearing, and language elements.
- ☐ Room surfaces, storage, and furniture materials should be selected to avoid disruptive reverberation qualities resulting in distortion.
- ☐ If diagnostic audiological services are offered, a specially constructed, sound treated suite providing adequate attenuation of outside noise should be available. For maximum noise levels, see recommendations in *American National Standard Criteria for Background Noise in Audiometer Rooms* (ANSI, 1960/1971).

CLIMATE

- ☐ Space for speech-language pathology requires careful consideration of the climate.

Areas providing speech-language pathology are often smaller in size than the average instructional area. For this reason, they quickly respond to poor ventilation and high or low temperatures.

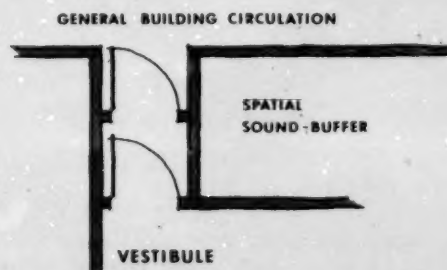
The nature of speech-language pathology activities requires a high level of human comfort related to air temperature, humidity, and ventilation. Discomfort related to climate may significantly impede successful speech-language pathology programs.

UTILITIES

- ☐ A sink is generally not required. However, speech-language pathologists who manipulate the oral structures inside the mouth need to have access to a place to cleanse hands and instruments.
- ☐ A telephone for outside calls should be conveniently located in an area that affords privacy for contacting parents, other educators, and people in the medical profession.
- ☐ Direct voice communication to the administrative offices is required in each distinct speech-language pathology area.

FIGURE 89

A vestibule entrance provides a buffer against outside noises.



It may be advisable to delete this capability from a testing area to avoid disruptions.

A signal light indicating an incoming call may be preferable to an auditory signal. This will minimize disruptions to activities.

- **Electrical outlets should be well distributed throughout a speech-language pathology area.**

REFERENCES

- American National Standards Institute. *American national standard criteria for background noise in audiometer rooms*. 1960 (Revised, 1971).
- American National Standards Institute. *Making buildings and facilities accessible to and useable by the physically handicapped* (A117.1). New York: Author, 1961.
- American Occupational Therapy Association. *The advanced training for the occupational therapist in the school systems: First year report, July 1, 1978—May 1, 1979*. Rockville MD: Author, in press.
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- Bednar, M. J., & Haviland, D. S. *Roles of the physical environment in the education of children with learning disabilities*. Troy NY: Rensselaer Polytechnic Institute, 1969.
- Gordon, R. The design of a preschool learning laboratory in a rehabilitation center. *Rehabilitation Monograph 39*. New York: Institute of Rehabilitation Medicine, NYU Medical Center, 1969.
- Hammill, D., & Wiederholt, J. L. *The resource room, rationale and implementation*. Philadelphia: Buttonwood Farms, Inc., 1972.

CHAPTER 4

Additional Readings

This chapter is the result of a thorough search of existing, available bibliographies in the field of facilities for special education and a search request for all literature in the field through the ERIC system. Criteria for inclusion were that the work be generally less than 10 years old (unless the source is a classic reference) and directly related to facility design programming or planning. Works of a general nature were not included unless they gave direction for facility design.

Abend, A. C. Criteria for selecting school furniture and equipment for the disabled. *CEFP Journal*, 1974, 12 (6), 4-7.

Basic performance criteria are offered for use in evaluating, comparing, and designing products for the disabled.

Abeson, A. & Blacklow, J. *Environmental design: New relevance for special education*. Arlington VA: The Council for Exceptional Children, 1971. (ED 05 5 404)*

Educational facilities for handicapped children are examined in terms of environmental design planning and needs. The first of four sections reports basic findings of the project regarding physical environment and special education. An interdisciplinary approach to research, which was appraised by questionnaires and site visits, presents the status of special education facilities in the United States. Presented are general findings and implications for design planning based on data gathered relating to student integration, community and parent involvement, the learning space, the educational program and activities, social adjustment, observation systems, transportation, and administrative planning. The second section focuses on planning mechanisms and strategies from the point of view of both architects and special educators. Some individual approaches to planning are presented, and mechanics of involving people in the planning process are discussed. The third section contains some specific solutions to environmental problems, with accompanying illustrative drawings. The final section presents selected research findings related to physical and psychological effects of environmental manipulation, research needs, and methodologies that can be used to conduct further research in this area.

Abeson, A. & Berenson, B. *Physical environment and special education. An interdisciplinary approach to research.*

Final report. Arlington VA: The Council for Exceptional Children, 1970. (ED 056 423)*

The project on physical environment and special education attempted to formulate research based statements that would assist both special educators and architects in designing educational facilities for special education. The major implication of all findings was the dearth of educators and facility planners trained and/or experienced in planning and designing special educational facilities. Data on teacher attitudes were included. Minor modifications in a teacher's working area could improve both the environment and the educational program, but teachers were excluded from planning school facilities in which they worked. Three areas for research efforts were suggested: evaluation of facility planning; measurement of effective use of environment; and assessment of the relationship between the individual and the physical environment. It was suggested that funding of improved special educational facilities might come from the government, both state and federal. The bulk of the report was appendixes concerning appraisal and reports on existing special education facilities in the United States; information useful to facilities planners and a special planning process guide; methodology for field experimentation for measuring the environmental role in the educational process; and dissemination of information.

Aiello, B. *Places and spaces. Facility planning for handicapped children and adults*. Reston VA: The Council for Exceptional Children, 1976.

Intended for special educators and architectural designers, the book provides specifications and lists of resource materials on facility design for handicapped children and adults. In an overview, R. Vosbeck discusses the need for cooperation between architects and educators and relates his experiences in planning facilities for exceptional children. An annotated bibliography contains 29 references to current literature on special facilities. Detailed are specifications for such school problem areas as inaccessible entrances, doorways, halls, and toilet facilities. A final section lists addresses and describes activities of 19 resource groups such as The American Institute of Architects and The Center for Independent Living.

American National Standards Institute. *Making buildings and facilities accessible to and useable by the physically handicapped*. New York: Author, 1961.

The first widely adopted set of standards for barrier free design approved in 1961 by the American Institute of Architects and subsequently adopted by many states and municipalities. It includes general principles and considerations, definitions, and standards for site development and building design.

American Society of Landscape Architects Foundation. *Barrier-free site design*. Washington DC: US Department of Housing and Urban Development, 1977.

A thorough research study of laws, cost/benefit, and population leading to specific site planning and design recommendations in the areas of site access, walks, walls, parking, drop-off zones, vegetation, lighting, signage, site furniture, and recreation considerations. There are many design sketches illustrating the criteria developed.

Bayes, K. *The therapeutic effect of environment on emotionally disturbed and mentally subnormal children*. London: Design Research Unit, 1966.

Environmental influences on emotionally disturbed and mentally handicapped children and the relationship between environment and therapy are investigated. The nature of space and of perception, animal and human behavior, and architectural psychology are described. Also described are subjects relating to planning and form, planning for social relationships, transition between areas, avoidance of ambiguity, architectural character and scale, consideration of the size of groups, corridors and circulation, room size and shape, flexibility, child participation, pattern and visual stimuli, furniture, and staff needs. Topics examined relating to color are color perception, the psychophysiological effect of color, color preferences, color schemes, and color and form. Sound, texture, temperature, time, smell, and symbolic significance are other sensory perceptions discussed. Research methods and problems and research needs are suggested. A list of persons and institutions visited or consulted about environmental therapy is provided.

Bayes, K., & Franklin, S. (Eds.). *Designing for the handicapped*. Montreal: Society for Emotionally Disturbed Children, 1971.

The 11 articles in the volume concern methods and techniques for designing specialized schools, institutions, and other buildings or accommodations for the handicapped and particularly for exceptional children (both handicapped and gifted). Written by architects and others in this field, the articles discuss incorporation of both the psychological and physical needs of the special populations into architectural design. In addition to discussions of the needs of the handicapped, design approach to an individual building, the possible therapeutic aspects of environment and environment for assessment, architectural design is also examined in relation to the following particular exceptionalities: educable mentally retarded, mentally ill, maladjusted children, visually handicapped, aurally handicapped, learning disabled, and gifted. Appended are a list of research projects involving environmental design factors and the handicapped with brief

descriptions of each project, and a bibliography of material written specifically for architects and planners or relevant to the design of the environment as it particularly relates to the handicapped.

Bednar, M.J. *Architecture for the handicapped in Denmark, Sweden, and Holland*. Ann Arbor MI: University of Michigan, 1974.

A report of a research study trip to northern Europe made by the author with three objectives: to learn how each country has organized its resources to provide care and education for the handicapped, and how this organization has influenced the planning and design of facilities; to document each facility visited through photographs, plans, and data; and to evaluate facilities in terms of user satisfaction and behavioral criteria. The report is in three sections (Denmark, Sweden, and Holland), each dealing with 15 investigative issues. Numerous photos and plans are included.

Bednar, M. J. (Ed.) *Barrier-free environments*. Stroudsburg PA: Dowden, Hutchinson & Ross, 1977.

This edited series of 14 papers by noted authorities is organized in two parts: Physical Barriers and Social Barriers, with two sections in each part: Theoretical Perspectives and Barrier-Free Implementation. The primary objective is to establish both philosophical and practical directions that will aid in coordinating various research, planning, design, administrative, and legislative efforts on behalf of the handicapped.

Bednar, M.J., & Haviland, D.S. *The role of the physical environment in the education of children with learning disabilities*. Troy NY: Rensselaer Polytechnic Institute, 1969. (ED 034 377)*

Current thinking on the role of the physical environment in special education is summarized in this report. The material has been synthesized into a position that has been developed through widespread contacts with special educators and architects interested in the problem. The paper develops this position in nine topical areas: the concern, exceptionality, learning disabilities, special education, role of environment, environmental variables, environmental conceptualizations, program factors, and directions. The primary attempt has been to underscore the issues and to lay some groundwork for future efforts. Not available in hard copy due to widespread marginal legibility of original document.

Birren, F. *Color & color*. New York: Reinhold Publishing Corp., 1967.

A discussion of the world of color considers the sources of color, light, color production in the brain, and the effects of different kinds of light and color on man, animals, plants, insects, fish, and birds, especially in growth and sexual activity. Brilliant light and warm colors are said to produce increased muscular tension, attraction to the stimulus, automatic arousal, and increased cortical activity. The effects of dim light and cool color are relaxation of muscles, withdrawal from stimulation, and a drop in respiration rate, heart action, and blood pressure. The visual aspects of color described are the amount of light necessary for sight, glare, and abuse of the eyes. Color laws are suggested for designers. Included in the psycho-

logical aspect of colors are the influence of specific colors, reactions of the mentally ill, and practical applications of research. Conclusions stated are the use of light and warm colors to produce outer directed behavior and the use of softer light and cooler hues to reduce distraction and direct action inward.

California State Department of Education. *Special schools for exceptional children*. California State Department of Education, Bureau of School Planning, 1973. (ED 097 761)*

As new educational programs emerge and changes are made to meet the needs of pupils, appropriate adaptations must likewise be made in school buildings. This publication relates programs for exceptional children to the facilities that make possible the implementation of such programs. The exemplary programs and facilities described in this publication have been selected to represent all areas of the state of California so that school personnel might visit existing facilities and learn from the experiences of others. The publication demonstrates what can be accomplished when constructive, innovative ideas for the education of exceptional children are combined with flexible, imaginative school planning methods.

Dailey, R. F. Media in the round. Learning in the special experience room. *TEACHING Exceptional Children*, 1971, 4, 4-9.

Described are educational facilities, development, objectives, and educational programs of the instructional media room of a Warrminster, Pennsylvania, elementary school.

D'Alonzo, B. J., D'Alonzo, R. L., & Mauser, A. J. Developing resource rooms for the handicapped. *TEACHING Exceptional Children*, 1979, 11(3), 91-96.

The article explores the use of resource rooms with educable mentally handicapped students. Five resource room variations (categorical, cross categorical, non-categorical, specific skills, and itinerant) and 11 values associated with the resource room concept are listed. Considerations in the design of the resource room, including both personnel and physical structure, are discussed. Data from an exemplary resource room are presented. Also included is a facility and resource analysis questionnaire. Photographs, figures, and a floor plan for a resource room accompany the article.

Educational Facilities Laboratories, Inc. *Arts and the handicapped. An issue of access. A report*. New York: Author, 1975.

A handicapped person's choice of accessible arts activities is very limited. This report focuses on the people and places now developing facility, planning, and program solutions that enable the handicapped to participate in the arts to their fullest potential. The 131 stories about outstanding facilities and programs, current legislation, and technical and design consultants serve as a foundation on which other schools, art institutions, and community centers can build a humane, totally accessible environment for the arts. The appendixes contain resource material including partial lists of nature centers, trails, and fragrance gardens; agencies that are interested in removing architectural barriers to the handicapped and

that have produced literature on the subject; and a selected bibliography on barrier free design.

Florida State Department of Education. *Designing facilities for language, speech, and hearing programs in Florida public schools*. Tallahassee FL: Author, 1973. (ED 081 15a)*

Results are reported of a needs survey and of specific planning processes concerning facilities for the approximately 45,000 language, speech, and hearing handicapped school age children in Florida. Detailed are findings from clinician completed questionnaires in regard to available space and physical structure factors that deter a child from hearing, seeing, or acquiring language in individual schools or mobile speech and hearing units. Some of the results given indicate that in 1969 - 1970, 1,259 of Florida's 1,854 schools served 32,523 children with therapy; that only 64 of 342 schools built after 1960 had facilities for language, speech, and hearing therapy; and that most clinicians used the library conference room or other inadequate areas, such as the custodian's storage area. Appended are examples of the three questionnaires. Planning processes are described in terms of the planners and the format for writing specifications for instructional programs and ancillary services. Included are specifications for housing language, speech, and hearing programs in Florida's public schools; for a language, speech, and hearing facility serving 50,000 school age children with evaluations, diagnostic therapy, and inservice education; for facilities to house preschool programs for children with severe language disorders; and for mobile unit design. Typically included in a specification are a program description and analyses of needs in relation to space, equipment, furniture, special considerations, and space relationships. Suggestions are made regarding space and equipment required by itinerant personnel, and the appropriate number of language, speech, and hearing centers within individual school plants.

Frost, F.G. Pre-primary building for the deaf. *Interiors*, December 1965, pp. 80-84.

This brief report includes photographs and plans of a new \$1,000,000 preprimary residential school for the deaf.

Goldsmith, S. *Designing for the disabled*. London: Royal Institute of British Architects, 1967.

Implications of the merits of normality and independence for the disabled and their relevance to architectural design criteria are discussed. The introduction reflects the philosophical approach to the design and construction of public buildings and housing. Nine principal sections provide data and recommendations on the following topics: anthropometric considerations of disabled people, building elements and finishes (staircases, handrails, windows, doors, floor finishes), service installations (refuse disposals, heating, electrical services, communications, mechanical installations), general spaces (entrances, kitchens, living and dining rooms, bedrooms, sanitary accommodations, laundry, garages), public buildings (office buildings, transport, health, recreation, auditoriums, schools, hotels), and domestic housing (planning of dwellings, check list of recommendations). An appendix lists cost implications, definitions of terms, selected refer-

ences, bibliographical references, and organizations associated with the welfare of the disabled. Illustrations with dimensions given in feet and metric equivalents are provided.

- Gordon, R. *The design of a preschool learning laboratory in a rehabilitation center*. New York: New York University, New York Medical Center, 1969. (ED 033 764)*

A developmental setting for multiply handicapped preschool children and the physical layout of the classroom are described. Photographs and drawings of specially designed educational equipment, such as a shallow sand and water table adapted for wheelchair-bound children and an adjustable easel that allows armless children to paint with their feet, show the use of the materials and their design construction. Commentary is included describing the function and purpose of each learning material along with the history of the school, its medical setting, and the educational philosophy of the program.

- Harris, K., & Baskin, B. *The exceptional child in the school library. Identification and accommodation*. 1974. (ED 097 897)*

There should be no barriers to school library use for handicapped children, since their limitations may make the library a window on the world which they would not otherwise have. Sometimes these children who most need help may not be tolerated in a library because of their behavior, or the library may not provide appropriate materials. There are ways in which librarians may learn to handle aggressive and withdrawn children, as well as those who are not self directed. The librarian must also have information easily available in a form that is usable by handicapped children and must avoid creating architectural barriers for children in wheelchairs and on crutches. The library should also provide a variety of environments so that a child may find a space that is comfortable.

- Hewett, F. M. *Educational engineering with emotionally disturbed children*, 1967, 33 (7), 459-467.

An engineered classroom is presented as a behavior modification model for emotionally disturbed children, in both institutional and public schools. The ways in which it provides a setting for implementation of a hierarchy of educational tasks, meaningful rewards for learning, and an appropriate degree of teacher structure are explained. The classroom layout, the students, classroom operations, and interventions are described; implications of the engineered classroom design are also discussed.

- Johnson, W.E. *Some considerations in designing facilities for the deaf*. Portland OR: Portland Center for Hearing and Speech, 1967.

Dependence upon the use of hearing aids, auditory training, speechreading or lipreading training, and tactile channels of learning are presented for consideration in designing facilities for the aurally handicapped. Conditions that change sound are listed: shape and size of room, whether or not room is furnished, materials of walls and ceiling, kinds of furnishings, and position of the listener. Reflection of sound from room surfaces and the level of sound pressure are discussed. Also discussed are the problem of reverberation, monaural hearing aids, speech intelligibility, and the treatment of reverberation. Different types of

noises, noise carriers, and insulation are described; also considered are the sound level of noise, planning facilities for the deaf, and electrostatic shielding or ground systems.

- Kliment, S.A. *Into the mainstream. A syllabus for a barrier-free environment*. American Institute of Architects, 1975. (ED 112 492)*

This syllabus contains practical information necessary to plan a barrier free environment. The first chapter provides an account of what has happened in the past generation to make buildings and spaces accessible to handicapped persons and reviews the most recent laws, codes, and standards to prescribe the accessibility of buildings. The second chapter describes the basic physical and procedural barrier conditions that the handicapped face. The third chapter contains solutions to the removal of barriers, including drawings illustrating some of the most common conditions. It also contains techniques for organizing community barrier free action groups and methods for evaluating compliance with applicable laws and regulations. The fourth and final chapter offers supplementary sources of information. Annotated published sources, a sample questionnaire for use in evaluating accessibility of buildings, and a listing of public and voluntary agencies whose staffs can help in more detail with guidance in particular areas are provided.

- Lauder, R. *The goal is mobility. Environmental and transportation barriers encountered by the disabled*. Washington DC: National Citizens Conference on Rehabilitation of the Disabled and Disadvantaged, 1969.

The problem of physical disability is growing as modern technology increases, due to a combination of increased injury rates and improved medical techniques, resulting in a rapidly growing number of surviving disabled persons. Despite the increasing incidence of disability, unnecessary physical barriers that exist throughout society prevent four-fifths of all employable disabled adults from earning a living. This report covers the four areas where environmental barriers are most serious: housing, public facilities, transportation, and recreation. Federal, state, and local programs to eliminate barriers and future areas of emphasis in reducing barriers to mobility are considered.

- Mace, R. L. *An illustrated handbook of the Handicapped Section of the North Carolina State Building Code*. Raleigh: North Carolina Department of Insurance, 1974.

This useful set of standards is well illustrated graphically. The document includes definitions; site development; buildings; requirements for residential, institutional, and instructional facilities; and several appendixes.

- Mace, R.L. *Accessibility modifications*. Raleigh: North Carolina Department of Insurance, 1976.

This is a useful guide to making barrier free access modifications within existing buildings, including specific design recommendations for entrances, doors, floors, level changes, toilets, and other building features.

- Molloy, L. *The handicapped child in the everyday classroom*. Phi Delta Kappan, 1975, 56, 337-340.

Handicapped children learn better when integrated into a regular classroom via specially designed learning centers that provide environmental alternatives and a gradual adjustment to the normal classroom setting.

Nellist, I. *Planning buildings for handicapped children*. Springfield IL: Charles C Thomas, 1970.

Buildings and the larger environment can both make a positive contribution to the well-being, education, and development of mentally handicapped children. Because of the wide variety of handicaps experienced by children and different community opinions and practices, standard solutions are not recommended. Rather, an examination is made of the various needs that arise, the types of buildings that might best serve those needs, and what may be the most effective total environment. Some reference is made to the needs of physically handicapped children. The book covers space arrangements both indoors and out, considerations of lighting, heating, building finishing, residential and nonresidential design, service facilities, and the complex relationship to the surrounding community.

Niemoeller, A.F. Acoustical design of classrooms for the deaf. *American Annals of the Deaf*, 1968, 113 (5), 1040-5.

Acoustical design of classrooms for the deaf is discussed, with the objectives of providing both large signal and low noise levels. Aspects described include reverberation time, noise criteria, location of the classrooms, and location of the school building. For each, building details and finishing materials are prescribed; acoustical data are specified when relevant. Two figures and three references are provided.

Ontario Department of Education. *Social environments for a regional centre for the hearing handicapped. A pre-architectural investigation and recommendation*. Toronto: Author, 1970. (ED 055 349)**

This report explores environmental alternatives and optimums for a regional center for hearing impairment. The intent is to inform planners, architects, and educators of needs that are translatable into socially purposeful architecture. The objective is to encourage environmental solutions that reflect the educational concerns and social implications of the programs for the hearing handicapped in Ontario. The report attempts to specify how places and events in a regional center might relate to one another and to identify those elements of physical plans and social organization patterns that create institutional building forms and environments.

Ontario Department of Education. *Special education facilities. Schools and playgrounds for trainable mentally handicapped students*. Toronto: Author, 1971. (ED 058 688)*

This publication is intended to assist school boards in planning educational facilities for trainable mentally retarded children. The booklet contains designs illustrating both the general structure and specific room arrangements for various sizes of schools and various age groups. The designs show small, self contained schools where mobility in the grouping of classes and flexibility in the arrangement of training facilities can be achieved easily. In addition to building layout and classroom arrangement, suggestions are made concerning bathrooms, playroom, kitchen, craft room, principal's office, and staff and health room. Discussion of the playground area covers both the planning of outdoor areas and specific types of recommended playground equipment.

Ontario Department of Education. *Designing schools for the physically handicapped*. Toronto: Author, 1974. (ED 100 063)**

Society now realizes that people who are physically handicapped need not be segregated but should be integrated into community activities whenever possible. This document provides specifications for removing architectural barriers and modifying existing structures so that all citizens will have access to school buildings. The document has three main sections: General Design Information, Modification of Regular Schools, and Additional Criteria for Special Schools.

Per-Gunnar Braf. *The physical environment and the visually impaired*. Bromma, Sweden: ICTA Information Center, 1974. (ED 093 115)*

This publication begins with a general description of the implications of impaired vision, including definitions, statistics, different types of problems regarding vision, different means of orientation, and orientation ability. It presents the basic and general problems involved in planning for people with impaired vision. Some suggestions for general solutions are also given.

Public Buildings Service. *Design criteria; New public building accessibility*. Washington DC: General Services Administration, May 1977.

Developed by GSA in response to Section 2 of Public Law 90-420, which authorizes the administrator to prescribe standards for public building accessibility, this is a thorough set of design criteria beginning with a definition of the user and anthropometric data leading to general requirements for horizontal access, vertical access, and communication and identification. This is followed by chapters on specific exterior requirements (transportation areas, parking, grounds, plazas, walks, entrances) and interior requirements (lobbies, corridors, rest rooms, libraries, and special employee areas). Design requirements are graphically illustrated.

Russo, J.R. Mainstreaming handicapped students. Are your facilities suitable. *American School and University*, 1974, 47 (2), 25-32.

Recent court decisions demand that handicapped children receive equal educational opportunities and that proper facilities be provided. A special report provides an up-to-date picture of the problems and describes how some schools and colleges are providing proper facilities for handicapped students.

Salmon, F.C., & Salmon, C. *The blind, space needs for rehabilitation*. Stillwater: Oklahoma State University, 1964.

Based on the observation and analysis of 14 rehabilitation centers for the blind, the report presents to both architect and administrator the following environmental considerations: geographical location, community features, site considerations, site development, program development, planning principles, and environmental experience. Areas of rehabilitation activity explained for the architect include medical services, psychological and social services, mobility and orientation, physical conditioning, communications, occupational therapy, techniques of daily liv-

ing, vocational evaluation, recreation, residential centers, and staff-client space estimate. The report includes 35 illustrations and 23 references.

Salmon, F.C. & Salmon, C. *Sheltered workshops: An architectural guide*. Stillwater: Oklahoma State University, 1966.

Based on the observation of 24 sheltered workshops of diverse types and sizes, the guide presents information on architectural programing and planning. The role of the sheltered workshop, community needs, site considerations, and the program are described. In addition, planning principles, work principles, and the physical plant are discussed and graphically illustrated. An appendix provides the following: a checklist for planning and construction; an analysis of materials and methods of construction; a glossary of commonly used terms; American Standard Specifications for making buildings and facilities accessible to and usable by the physically handicapped; and a list of workshops studied.

State University Construction Fund. *Making facilities accessible to the physically handicapped*. Albany NY: Author, 1967. (ED 029 439)*

Guidelines on performance criteria for the State University of New York consider two main types of handicapped: the ambulant and the semiambulant, including some physically handicapped, the visually and aurally handicapped, persons with cardiac conditions, and persons confined to wheelchairs. The handicapped and planning for them are discussed. Specifications are detailed for the following aspects of exterior design: entrances, ramps, stairs, doors, walks, intersections, gratings and manholes, parking, and bus service. Interior design criteria cited are for general university facilities, rest rooms, bedrooms, stairs, elevators, doors, conveniences, and fire protection. Persons involved in or contributing to the study are named, and 19 references are listed.

Texas Education Agency. *Architectural considerations for classrooms for exceptional children*. Austin: Texas Education Agency, 1967. (ED 028 587)*

Definitions are provided of the following exceptionalities: blind, partially sighted, physically handicapped, minimally brain injured, deaf, educable mentally retarded (primary

junior, and senior high levels), trainable mentally retarded, speech handicapped, and emotionally disturbed. Architectural guidelines specify classroom location, size, acoustical treatment, heat and light, ventilation, electrical outlets, bulletin boards and chalkboards, floors, drinking fountain, sink, and counter space. Additional specifications are given for certain exceptionalities.

University of Tennessee. *Planning facilities for physically handicapped children. Fifth annual conference*. Knoxville: University of Tennessee, College of Education, 1974. (ED 102 763)*

To establish criteria in planning guidelines for making educational facilities usable by handicapped students, the School Laboratory at the University of Tennessee questioned chief state school officers concerning the methods of identifying the handicapped and providing the type of facilities they need. This report of a panel of experts summarizes three participants' thinking in brief excerpts from their speeches, which included the following: eliminating Architectural Barriers in Educational Facilities, by Tim Nugent; Options for Planning Comprehensive Services for the Handicapped, by Larry Molloy; and Vocational Program and Facilities for the Handicapped, by David Ward. The Tennessee guidelines resulting from the complete study, of which this conference was a part, are detailed.

Wolf, J.M. Physical facilities guidelines for handicapped children. Fitting facilities to the child, part three. *School Management*, 1967, 11 (2), 40-54.

Synthesized from the recommended standards of the only eight states that have them, the guidelines list the variations needed in classrooms and other physical facilities for the handicapped. Areas considered include the physically handicapped, the deaf and hard of hearing, the partially sighted, the blind, the educable mentally retarded, the trainable mentally handicapped, and the emotionally handicapped. Also treated are physical and speech correction programs, psychological examination programs, and occupational therapy programs. For each, location, size, construction, and equipment are specified. Photographs of the equipment and facilities at the Human Resources School in Albertson, New York, are included.

Availability

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Appendix

- A. The Research Project**
- B. Definitions of Service Levels**
- C. Research Forms**
- D. School Sites Visited**
- E. Project Participants**

A. The Research Project

As mentioned in the Preface, this guide is the result of research in a study performed by the Maryland State Department of Education pursuant to a 2½ year grant from the Bureau of Education for the Handicapped, US Office of Education, Department of Health, Education, and Welfare.

Objectives

The general objective of the project was to provide a guide developed primarily from field based research which could be used to plan and construct public school facilities that are responsive to the needs of special education programs.

The primary objectives were as follows:

1. Development of a document that identified the process for planning and the criteria for design of educational facilities for handicapped students which have been developed out of field based research.
2. Passage of legislation proposed by the Maryland State Department of Education to the Maryland legislature mandating criteria for designing educational facilities for handicapped students.

The subordinate objectives were as follows:

1. Provision for two pilot workshops in the state of Maryland for architects, special educators, facility planners, and educational administrators about the criteria for designing educational facilities for handicapped students.
2. Establishment of procedures whereby the criteria are disseminated nationally.
3. Establishment of a component in the training program at the University of Maryland, School of Architecture, on criteria for planning educational facilities for handicapped students.

Most of the resources of this project were focused on the primary objective of developing a guide to the planning process and criteria for design of educational facilities for handicapped individuals. For the purposes of this document, only the organization and methodology of this objective will be discussed.

Organization

Achieving this objective involved three groups of people in addition to the project staff: an advisory committee, a working committee, and consultants to a working conference.

The advisory committee was composed of representatives from the American Institute of Architects; Maryland state legislature; Maryland Parent-Teachers Association; Maryland State Teachers Association; Maryland Association of Boards of Education; The Council for Exceptional Children; University of Maryland, School of Architecture; Maryland State Departments of Planning and General Services; and the Special Education Department of the University of Maryland.

The working committee was composed of in-state and out-of-state special educators, educational administrators, architects, facility planners, and a handicapped adult. The advisory and working committees were called upon periodically to review and make suggestions concerning the research methodology and the format and content of the guide.

The consultants to the working conference were special educators, architects, planners, professors of architecture or education, and researchers in the fields of architecture and environmental psychology. This group gathered for a two day working conference. They were asked to react to proposed research data collection and analysis methods and to the proposed format for the document. Eventually, they were also asked to review a draft copy of the guide.

Research Methodology

The primary objective of this research study was to develop performance based architectural programing and design criteria for use by educators and architects in developing facilities for special education programs. *Performance based* means that intended outcomes are stated as the criteria rather than the means for achieving outcomes. This form of criterion demands a creative response on the part of educators and architects, since several alternatives are possible. Performance based criteria are inherently more flexible in their use for writing educational specifications and programs as well as in evaluating proposed facility plans. Thus, the final form of all criteria developed are statements of intended results. The discussion of each criterion statement in Chapter 3

delineates the issues involved and gives direction for reaching solutions.

The primary methodology for developing these criteria was the evaluation of in-use special education facilities. Post-occupancy evaluation is a method whereby existing facilities are studied and analyzed as a basis for deriving criteria for future facilities. A basic assumption of this method is that the users of a facility are able to evaluate it for their purposes and that their purposes are a primary consideration in the design of the facility. Another assumption is that much can be learned from past successes and failures and that this knowledge can be extrapolated as a basis for future actions.

Postoccupancy evaluation is rapidly developing as a research method of great relevance and usefulness in a wide variety of settings. Clare Cooper (1975) used it in evaluating the housing and site plans at Easter Hill Village, and it was used to evaluate the dormitories at Berkeley (Van der Ryn & Silverstein, 1967). Other applications have been used in office environments and housing for the elderly. This is the first major application of this research method to special educational settings.

The essence of the evaluation act is the comparison of any proposal or object, design or plan with the criteria by which it is to be judged. The result is an appraisal or evaluation or the extent to which the entity being evaluated satisfies these criteria. Thus, one must first know what is being evaluated and the criteria for its evaluation. One must also decide who is going to do the evaluating and how it is going to be done. Furthermore, the purpose of the evaluation must be delineated.

The organization of this evaluation study was as follows:

1. What: The functional and architectural characteristics of special education facilities, including equipment and furnishings.
2. Criteria: The degree to which these functional characteristics support the activities taking place.
3. Who: Teachers, aides, students, and administrators using the facility. (The researcher also makes an evaluation from his or her perspective.)
4. How: The researcher analyzes each educational space and administers a structured interview to the user while in the space or facility.
5. Purpose: To develop architectural programming and design criteria.

The specific application of this general methodology and organization was developed in two phases. An initial set of procedures and data gathering instruments was developed by the project team in September 1977. They were then subjected to a thorough review and evaluation and limited testing. A pilot test was conducted at one school. The methodology was then reviewed by three independent environmental researchers, and it was debated at a working committee meeting. The field methods and instruments were then revised for implementation.

The resulting research method is one that relies upon teachers as the primary evaluators of educational spaces.

FIGURE 1

Site visits were made to 19 schools in 9 of the 10 standard federal regions.



Teachers' aides and students are secondary evaluators. Administrators are the evaluators of the overall facility.

The method is one that seeks quality in each evaluation as opposed to quantity of data gathered. It strives to develop an in-depth understanding of the activities and relevant environmental variables with a thorough evaluation by the teacher. Moreover, each teacher is interviewed at length to seek the reasons for his or her evaluations and to solicit directions for environmental improvements. The data gathered are relevant and meaningful but not always quantifiable. The analysis of the data is based upon conceptual correlation and content analysis rather than statistical inference.

Since the intention was to evaluate a limited number of schools more completely, the criteria for selecting them were very important. An initial identification of exemplary special educational programs was obtained through a questionnaire to state directors of special education. This survey solicited the following information:

1. Levels of special education services (as defined in the section of this appendix headed Definitions of Service Levels) a facility planning guide should address to be most helpful in the next 5 to 10 years.
2. A list of exemplary facilities for potential on-site visitation.

Responses to the questionnaire were received from 38 states. The results of the survey suggested that out of six levels of services (as defined later in this appendix), levels IV and V were those which should be addressed by a facility planning guide. The next service in order of priority was level III. The questionnaire also produced a potential list of sites. Further information about each site in the form of educational programs and a facility description was obtained from each school through a telephone interview. Initial guidelines for site visit selection were as follows:

1. School was designed or redesigned for special education.
2. School was not more than 5 years old (unless a redesigned school).
3. Special education enrollment was more than 50 students.
4. School provided level III, IV, or V services.
5. Facility was in at least its second year of occupancy.
6. Cooperation was available from the school system and principal.
7. Regional distribution throughout the United States.
8. Distribution of urban, suburban, and rural settings.

The first two criteria were not always followed. Additional criteria were added such as programs serving several disabilities in one school and developing a balanced data base, including the full range of age, disability, and level of service.

A total of 19 schools were selected and visited for data collection. They were located in 9 of the 10 standard federal regions as illustrated in Figure 1.

The characteristics of each school are presented in Figure 2, and the number of spaces studied by service and disability is described in Figure 3. Figure 4 indicates the number of teachers interviewed in each school by service area.

The typical field methodology is presented in Figure 5. The methodology was adjusted as necessary by the circumstances of the particular school and the schedules of the personnel and researchers. The first day was spent in getting oriented to the facility, deciding which spaces to evaluate, and analyzing the environmental characteristics of those spaces. The second day was spent primarily in behavioral observation of the chosen spaces. The third day was spent primarily interviewing teachers, aides, and students to obtain their evaluations of the spaces.

The data gathering forms and instruments are included later in this appendix. They are discussed there with emphasis upon the rationale behind their particular form.

Data Analysis

The primary data analysis was a correlation of the results of the environmental analysis with the results of the environmental evaluations. The spaces were sorted by the services that took place and the characteristics of the students. Patterns of correlations were sought between similar environmental attributes and high teacher evaluations. The researcher evaluations were used as a reliability check to determine the consistency with which teachers were evaluating. The method of reaching conclusions can be termed *triangulation*. When several imperfect methods (observation, teacher evaluation, researcher analysis, aide and student interviews) all begin to converge, the conclusion reached regarding that issue can be considered valid. This was the initial rationale for formulating a multifaceted methodology and became the basis for analyzing the data.

Conclusions were first reached regarding each space evaluated, and these were summarized on data form 1. A similar synthesis of conclusions was made for the overall building, and these were summarized. The result is 19 sets of general building criteria (one for each school visited) and 166 evaluations of educational spaces. These data are coded by service, disability, and school for easy retrieval during the final data analysis. The data were summarized at the end of each site visit.

Data analysis for the final report was based primarily upon the method of content analysis. Performance statements for each service area and the attendant discussion were achieved by synthesizing the results from each space evaluated in which that service was provided. The general environmental design criteria were developed through both content analysis and numerical weighting of the content of each environmental characteristic in all 166 spaces.

The method of data analysis was presented to a working conference composed of persons with a wide variety of backgrounds in education, research, and architecture. They were presented with the research data collected, the method for collection of the data, suggested procedures for analyzing the data, the proposed outline for the guide, and the format for the design criteria. The consultants were then asked to make a written response to the project team's proposals using a predeveloped questionnaire. Their comments confirmed that the anticipated conclusions could be supported by the data and that the accumulated experience of the research team should be included as data.

The final report was written by the project team scrutinizing the draft of each performance statement and debating its content. In this way, the cumulative experience of all four

team members was brought to bear upon the recommendations. The design criteria are primarily based on research data, although findings from available literature were added.

FIGURE 2
Characteristics of each school visited.

School	Characteristics												
	Preschool	Elementary	Secondary	Total no. of nonhandicapped students	Total no. of handicapped students	Hearing impaired	Mentally retarded	Orthopedically handicapped	Emotionally disturbed	Visually handicapped	Specific learning disabilities	Health impaired*	Multiply handicapped
1	x	x		0	272	x			x		x		
2	x	x		223	103			x		x			x
3				1300	70		x		x		x		
4	x	x		0	206	x	x	x	x	x			x
5			x	903	77		x	x			x		
6	x	x		850	77	x							
7		x		900	122		x	x	x		x		
8			x	1730	70	x	x				x		
9		x	x	0	275				x				
10	x	x		910	143	x	x			x	x		x
11			x	2060	101		x	x			x		
12			x	1050	150		x	x		x	x		x
13			x	1040	85	x	x				x		
14	x	x	x	0	232		x	x	x				x
15	x	x		385	115	x		x			x		
16	x	x		285	70			x					x
17			x	1720	80		x	x					
18		x		243	76			x					
19	x	x	x	0	113	x	x			x			x

*Health impaired and speech impaired students were housed in many of the schools visited. These two disabilities are usually subsumed into other categories of handicapped.

FIGURE 3
Number of spaces studied by service and disability.

Service	Disability								
	Hearing impaired	Mentally retarded	Orthopedically handicapped	Emotionally disturbed	Visually handicapped	Specific learning disabilities	Health impaired*	Multiply handicapped	Speech impaired*
Curriculum services									
General instructional classroom	16	14	27	19	7	18		13	
Art	4	5	3	5	1	5			
Home living skills	2	4	1	3		4			
Industrial arts	2	4	2	3	1	4		1	
Physical education	5	6	3	6	1	4		2	
Music	2	2		2		4		1	
Science	1	6	5	1	1	6		1	
Vocational education		1							
Resource	3	5	1	4		9			
Related services									
Physical therapy		1	4	1				3	
Occupational therapy			3			1			
Speech pathology	3	1		2		2			

*Health impaired and speech impaired students were housed in many of the schools visited. These two disabilities are usually subsumed into other categories of handicapped.

FIGURE 4
Number of teachers interviewed in each school by service.

Service	School																			Total
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	
Curriculum services																				
General instructional classroom	5	4	8	7		6	5	3	5	5	4	6	1	5	6	6	4	6	8	94
Art	1	1		1		1	1			1	1		1							8
Home living skills	1						1		1		1		1				1			6
Industrial arts							1		1		1	1	1	1						6
Physical education	1	1		1		1	1		1	1			1	1			1			10
Music	1		1			1	1			1										5
Science				1	1				1		2	1	1				1			8
Vocational education														1						1
Resource					3			2			1	1	4		2		2			15
Related services																				
Physical therapy		1												1		2		2		6
Occupational therapy		2														1		1		4
Speech pathology	1					1	1								1					6

Note. These figures are exclusive of administrators, aides, and teachers interviewed in each school.

FIGURE 5
Typical field methodology.

Day 1	
Administrator interview:	Form A — 1½ hours, early morning. Orientation to facility and program; organizing observations and interviews for 8-10 spaces. General building evaluation completed.
Environmental analysis:	Form B — 1 hour per space used for special education; black and white photography and/or slides of each space and technical measurement of environmental variables.
Faculty meeting:	½ hour, late afternoon. Discussion of the research project; scheduling interviews.
Day 2	
Behavioral mapping:	Form C — ¾ hour per space. Three observations at random 15 minute intervals.
Researcher evaluation and interview questions:	10 minutes per space. Development of specific interview probes and questions. Evening.
Day 3	
Teacher interviews:	Form D — 1 hour per interview. The actual space evaluation, including rationale.
Aide interview:	Form E — ½-1 hour. Group interview of interested aides to solicit opinions about the facility.
Student interviews:	Form F — ½-1 hour. Group interview of interested students to solicit input regarding the facility.
Exit interview:	½ hour, late afternoon. Discussions of site visit with the administrator.

B. Definitions of Service Levels

Six levels of services, as defined in the following discussion, were used in a questionnaire to state directors of special education. One question in this survey asked which levels of special education services a facility planning guide should address to be most helpful in the next 5 to 10 years.

Level I may be considered appropriate for the child who has been identified through the educational assessment as having an educational handicap in one or more of the following areas: cognitive, emotional, and/or physical, and who may be appropriately served in the general education program receiving supplementary services. Level I is designed to assist the regular education teacher in the development and implementation of a special education individualized education program through the provision of supplementary services that are not provided in the general program. Services provided include direct or indirect instructional consultation services to the teacher, or special materials, or both, and equipment. The minimum staffing ratio for level I service shall be one full time equivalent (FTE) professional for about 150 regular education teachers employed by the local education agency.

Level II may be considered appropriate for the student who has been identified through the educational assessment as having an educational handicap in one or more of the following areas: cognitive, emotional, and/or physical, and who may be appropriately served by receiving service through the special education program not to exceed an average of 1 hour per school day. Level II is designed to provide a program of special educational intervention directly to the student. This level is designed to meet the special educational needs of the handicapped child who requires a degree of educational intervention not available in the general education classroom. Services are provided by a professional on an intermittent or continuous basis (e.g., vision, speech, and language). The instruction may be given on an individual basis or in small groups. In addition, personnel serve as a resource to the teacher in suggesting activities that would enhance the student's achievement. The maximum caseload for level II service shall be 60 handicapped students with special educational needs per each full time equivalent professional.

Level III may be considered appropriate for the child who has been identified through the educational assessment as having an educational handicap in one or more of the following areas: cognitive, emotional, and/or physical, and who may be appropriately served by receiving special educational

services not to exceed an average of 3 hours per school day. Level III is designed to provide periods of more intensive special educational services (e.g., academic, vision, speech, language) on a regular basis. In addition, personnel serve as a resource to the teacher in suggesting activities that would enhance the student's achievement. The maximum caseload for level III services shall be 20 different handicapped students with special educational needs per full time certified special education teacher, or 30 different handicapped students if a full time aide is also provided.

Level IV may be considered appropriate for the student who has been identified through the educational assessment as having handicaps in one or more of the following areas: cognitive, emotional, and/or physical, and who may appropriately be served by receiving special educational services up to 6 hours per school day. Level IV is designed to provide a special class within a general education facility in which a student receives most or all of his or her basic educational program. Services include special education provided by a special education teacher, and related services as described in the individualized education program. The student shall participate in the general program as appropriate and shall have access to other supplementary services consistent with those provided to students in the general education program. The maximum class size for level IV service at the elementary level shall be an average of 10 handicapped students with special educational needs per full time teacher, or an average of 13 students if a full time aide is also provided. The maximum class size for level IV service at the secondary level shall be an average of 12 students with special educational needs per full time certified special education teacher, or an average of 15 students if a full time aide is provided.

Level V may be considered appropriate for the student who has been identified through the educational assessment as having a handicapping condition in one or more of the following areas: cognitive, emotional, and/or physical, and who requires a comprehensive special education setting for the entire school day in a special wing or day school. Services are provided in a comprehensive special education setting that includes special equipment and related services. The maximum class size for level V service for handicapped children shall be an average of 6 handicapped students with special educational needs per full time certified special education teacher, or an average of 9 if a full time aide is pro-

vided. The maximum class size for level V service for children with significant physical impairments shall be an average of 7 handicapped students per full time certified special education teacher and a full time aide.

Level VI may be considered appropriate for the student who has been identified through the educational assessment as having a handicap in one or more of the following areas: cognitive, emotional, and/or physical, and who requires 24 hour special education programing and personal care. Level

VI is designed to provide instruction or treatment, or both, on a short term or long term basis in a residential setting, which includes a comprehensive special education program, special equipment, related services, and 24 hour personal care. The maximum class size for level VI service shall be an average of 4 handicapped students with special educational needs per full time certified or licensed professional, or an average of 7 per class where an aide is present.

C. Research Forms

Administrator Interview (Form A)

The administrator of the school was interviewed to gain basic information about the programs conducted, staff, and students. His or her recommendations were solicited concerning exterior and interior design features. The administrator was the primary evaluator of the entire facility. The second part of form A solicited the administrator's evaluations of nine building characteristics including the rationale for these evaluations. The technical description of these characteristics as to number, dimension, or type was determined by the researcher. An option was provided for the researcher to enter his or her own evaluation and rationale for each characteristic. A copy of the building plans was obtained, and the building characteristics photographed. During this interview the spaces to be evaluated were determined, and the teacher interviews organized. Criteria for choosing teacher interviews included having taught at one other school, the length of time in this school and space, and the length of time teaching the same or a similar population.

Environmental Analysis (Form B)

In order to know what functional/architectural characteristics were being evaluated at each site, the staff obtained an analytical description of each evaluated space. While the space was unoccupied, the researcher made certain environmental measures to describe the lighting, climate, space, acoustics, relationship to other spaces, surface materials, display opportunities, storage, utilities, equipment, and furniture. The researcher also made a sketch of the floor plan indicating locations of equipment and furnishings. Black and white photos and/or slides of the space were taken.

Behavioral Mapping (Form C)

The researcher observed each space to be evaluated for three 15 minute periods recording activities, their locations, the number of children involved, and the furniture and equipment used. During the course of this observation process the researcher became familiar with the relationship between the activities and the physical environment. Questions formulated about that space were then added to the standard teacher interview.

Space Evaluation (Form D)

The researcher administered a verbal questionnaire to the teacher using the educational space being evaluated. The teacher described the activities that occurred in the space. The numbers of children, their groupings, ages, and disabilities were also identified. A standard set of activity categories, disabilities, and groups was provided for standardization. The length of the teacher's experience in that school and space and in other schools was noted.

The teacher then evaluated each functional/architectural characteristic in terms of its suitability for the educational activities. The teacher also was asked to note any inadequacies and/or design changes that might improve the environment.

The researcher independently evaluated each functional/architectural characteristic of each space by noting agreement or disagreement with the teacher and any relevant comments or observations. Finally, the teacher was asked a series of survey questions in an effort to focus recommendations upon specific design features. This was the most intensive part of the methodology. It took the most time but also yielded the richest, most useful data.

Classroom Evaluation (Form E)

Interested teachers' aides who volunteered were requested to evaluate their classroom space. A set of 12 questions relating to the environmental characteristics of their classroom was asked. The frame of reference was the activities that occur there.

Student Facility Evaluation (Form F)

Volunteer students were requested to participate in the study by providing their evaluations of the entire school as well as specific spaces. A set of 13 questions was predeveloped to stimulate discussion and to form a framework for comparison of student responses between schools.

REFERENCES

- Cooper, C. *Easter hill village*. New York: The Free Press, 1975.
Van der Ryn, S., & Silverstein, M. *Dorms at Berkeley*. New York: Educational Facilities Laboratories, 1967.

FIELD FORM A

Part 1: Administrator Interview

School: _____ Level of Services: _____
 Location: _____ Researcher: _____
 Administrator: _____ Date: _____

STUDENTS (Number by disability, severity, and age or grade)

A. _____
 B. _____
 C. _____
 D. _____
 E. _____
 F. _____

STAFF (Number by teaching role and full time or part time)

Teachers: a. _____
 b. _____
 c. _____
 d. _____
 e. _____
 f. _____
 Aides: a. _____
 b. _____
 c. _____
 Other: a. _____
 b. _____
 c. _____
 d. _____

PROGRAMS _____

EVALUATION What one interior design feature would you recommend be omitted?

What one exterior design feature would you recommend be omitted?

What one interior design feature would you recommend be repeated?

What one exterior design feature would you recommend be repeated?

FIELD FORM A

Part 2: Administrator Evaluation of Building Characteristics

	DESCRIPTION	ADMINISTRATOR EVALUATION AND RATIONALE Strengths and Weaknesses (Excellent, Average, or Poor)		RESEARCHER EVALUATION AND RATIONALE	
ENTRY AREA Size, Covered Area, Surface		E A P			E A P
BUS LOADING AND UNLOADING Number of Spaces, Distance to Entry		E A P			E A P
PRIVATE VEHICULAR DROP-OFF AND PICK-UP Number of Spaces, Distance to Entry		E A P			E A P

	DESCRIPTION	ADMINISTRATOR EVALUATION AND RATIONALE Strengths and Weaknesses (Excellent, Average, or Poor)		RESEARCHER EVALUATION AND RATIONALE	
OUTDOOR PLAY AREAS Size, Surface, Location, Equipment		E A P			E A P
EXTERIOR CIRCULATION Walkways, Ramps, Site Stairs		E A P			E A P
INTERIOR CIRCULATION Doorways, Halls, Stairs, Barrier Free		E A P			E A P

	DESCRIPTION	ADMINISTRATOR EVALUATION AND RATIONALE Strengths and Weaknesses (Excellent, Average, or Poor)		RESEARCHER EVALUATION AND RATIONALE	
FLOOR PLAN Spatial Relationships, Layout, Form		E A P			E A P
MAINTENANCE Wear, Damage, Uncleanliness		E A P			E A P
FIRE SAFETY Egress, Alarms, Extinguishers		E A P			E A P

FIELD FORM B

Environmental Analysis

School: _____ Researcher: _____
 Location: _____ Date: _____
 Room Name and Number: _____ Time: _____

SURFACES (material, finish, color)
 Walls _____
 Ceiling _____
 Floor _____

LIGHTING (fixtures: type, wattage, number, location)
 a. _____
 b. _____
 Control switches (type, number, location) _____
 Area of window (sq. ft.) _____
 Orientation: North _____ South _____ East _____ West _____
 Darkening devices _____

ACOUSTICS Average occupied ambient noise level: Low _____ Medium _____ High _____
 Source of distracting sound (inside and outside room) _____

CLIMATE
 Heating (type and location) _____
 Cooling (type and location) _____
 Ventilation (mechanical) _____
 Operable window area _____
 Temperature: 65°-70° _____ 70°-75° _____ 75°-80° _____
 Odors _____

SPATIAL LOCATION
 Adjacent spaces (name) _____
 Direct access to spaces (name) _____

STORAGE
 Open Shelving: a. length _____ depth _____
 b. length _____ depth _____
 c. length _____ depth _____ Total length _____
 Closed Storage: a. (H x W x D) _____ Cu. ft. _____
 b. (H x W x D) _____ Cu. ft. _____
 Counter Surface: a. length _____ depth _____ area _____
 b. length _____ depth _____ area _____
 c. length _____ depth _____ area _____

DISPLAY
 Tackboard: a. length _____ height _____ area _____
 b. length _____ height _____ area _____
 c. length _____ height _____ area _____ Total _____
 Chalkboard: a. length _____ height _____ area _____
 b. length _____ height _____ area _____
 c. length _____ height _____ area _____ Total _____
 Length of tackstrip: a. _____ b. _____ c. _____ Total _____
 Other display _____

EQUIPMENT (number and type)
 a. _____
 b. _____
 c. _____
 d. _____
 e. _____
 f. _____
 g. _____
 h. _____

FURNITURE (number, type, material)

- a. _____
 b. _____
 c. _____
 d. _____
 e. _____
 f. _____
 g. _____
 h. _____

UTILITIES (number, type, location)

Electrical outlets _____
 Telephone _____
 Intercom _____
 Television _____
 Toilets _____
 Sinks _____
 Other _____

SPACE length _____ width _____ area _____ sq. ft.
 height _____ volume _____ cu. ft.

FLOOR PLAN (Sketch plan to scale showing walls, doors, fixed equipment, large furniture, and location of photos.)

Scale: $\frac{3}{16}'' = 1'-0''$ $\frac{3}{16}'' = 2'-0''$

	68	64	60	56	52	48	44	40	36	32	28	24	20	16	12	8	4	0
	0	2	4	6	8	10	12	14	16	18	20	22	24	26	28	30	32	34
56	0																	
52	2																	
48	4																	
44	6																	
40	8																	
36	10																	
32	12																	
28	14																	
24	16																	
20	18																	
16	20																	
12	22																	
8	24																	
4	26																	
0	28																	

FIELD FORM C

Behavioral Mapping

School: _____ Room: _____ Time: _____

Record, in narrative, the location of activities taking place during the 15 minute observation period, including any movements or changes. Use the Standard Groups, Disabilities, and Activity Categories given on Field Form D. Indicate lighting, storage, display, equipment, furniture, utilities, and space utilized. Also indicate sound produced.

Time: _____

FIELD FORM D

Environmental Evaluation

School: _____ Researcher: _____

Location: _____ Date: _____

Room Name and Number: _____ Time: _____

TEACHER Name _____ Aide name _____

Length of time using space _____

Length of time in school _____

Teaching experience at other schools _____

STUDENTS (disabilities, ages, numbers; ambulatory or nonambulatory)

a. _____

b. _____

c. _____

ACTIVITY Activity _____

SCHEDULE Grouping _____ Time _____

Duration _____ Frequency _____

Location in room _____

Activity _____

Grouping _____ Time _____

Duration _____ Frequency _____

Location in room _____

Activity _____

Grouping _____ Time _____

Duration _____ Frequency _____

Location in room _____

Activity _____

Grouping _____ Time _____

Duration _____ Frequency _____

Location in room _____

Activity _____

Grouping _____ Time _____

Duration _____ Frequency _____

Location in room _____

FIELD FORM D (continued)

Activity	_____	_____
Grouping	_____	Time _____
Duration	_____	Frequency _____
Location in room	_____	_____
Activity	_____	_____
Grouping	_____	Time _____
Duration	_____	Frequency _____
Location in room	_____	_____
Activity	_____	_____
Grouping	_____	Time _____
Duration	_____	Frequency _____
Location in room	_____	_____
Activity	_____	_____
Grouping	_____	Time _____
Duration	_____	Frequency _____
Location in room	_____	_____

QUESTIONS:

a. What activities take place in this room that should not?

b. What activities should take place in this room but do not?

	TEACHER EVALUATION AND RATIONALE Strengths and Weaknesses (Excellent, Average, or Poor for Activities)		RESEARCHER EVALUATION AND RATIONALE	
SURFACES Walls, Ceiling, Floor Material, Finish, Color	E A P E A P E A P			E A P E A P E A P
LIGHTING Artificial and Natural Controls for Both	E A P			E A P
ACOUSTICS Inside and Outside Noise	E A P			E A P

	TEACHER EVALUATION AND RATIONALE Strengths and Weaknesses (Excellent, Average, or Poor for Activities)		RESEARCHER EVALUATION AND RATIONALE	
CLIMATE Heating, Cooling, Odors, Ventilation	E A P			E A P
SPATIAL LOCATION Adjacency, Access	E A P			E A P
SPACE Area, Height, Layout	E A P			E A P

	TEACHER EVALUATION AND RATIONALE Strengths and Weaknesses (Excellent, Average, or Poor for Activities)		RESEARCHER EVALUATION AND RATIONALE	
STORAGE Shelves, Closets, Cabinets, Counters	E A P			E A P
DISPLAY Tackboard, Chalkboard, Tackstrip	E A P			E A P
EQUIPMENT Number and Type	E A P			E A P

	TEACHER EVALUATION AND RATIONALE Strengths and Weaknesses (Excellent, Average, or Poor for Activities)		RESEARCHER EVALUATION AND RATIONALE	
FURNITURE Number, Type, Material	E A P			E A P
UTILITIES Electricity, Telephone, Intercom, Television, Toilets, Sinks	E A P			E A P

COMMENTS:

SURVEY QUESTIONS

1. What one design feature in this room would you *omit* in future schools?

2. What one design feature in this room would you *change* in future schools?

3. What one design feature in this room would you *repeat* in future schools?

Observation probe 1:
.....

Observation probe 2:
.....

4. What one exterior design feature would you *change* or *omit* in future schools?

5. What one exterior design feature would you *repeat* in future schools?

6. What one interior design feature would you *change* or *omit* in future schools?

7. What one interior design feature would you *repeat* in future schools?

COMMENTS:

Researcher Guide to Form D

INTRODUCTORY STATEMENT The intention of this study is to develop programming and design criteria to be used by school planners and architects to develop special education facilities. It is sponsored by the Bureau of Education for the Handicapped and the Maryland State Department of Education.

The primary method for developing these criteria is to study and evaluate existing in-use special education facilities. The teachers in those facilities are our prime sources of information. Therefore, I would like to interview you to learn about the activities taking place in this space and your evaluation of the degree to which this physical environment supports or discourages these activities.

I have taken time, during the last two days, to analyze this educational space and to observe the children and you using the space. Some of the questions are standard and others are spontaneous. Please feel free at any time to ask for an explanation of the question or to add comments.

STANDARD GROUPS

Age: Infant (0-1)
Preschool (1-5)
Primary (5-12)
Intermediate (12-16)
Secondary (16-21)

Size: Individual (1)
Small (2-4)
Medium (5-9)
Large (9 and up)

DISABILITIES	Visually handicapped
	Hard of hearing
	Deaf
	Mentally retarded
	Speech impaired
	Seriously emotionally disturbed
	Orthopedically impaired
	Specific learning disabilities
	Medically handicapped (kind)
	Multiply handicapped (which combination)
SEVERITY	Mild, Moderate, Severe, Profound
ACTIVITY CATEGORIES	Fine Motor: body image, sensory training, coordination
	Gross Motor: fitness, exercise, games, mobility
	Communication: language, perception, expression, reading
	Self Care: Hygiene, dressing, eating, socialization
	Basic Knowledge: numbers, time, money, nature, environment
	Vocational: directions, tasks, skills, jobs
	Curriculum: Art, Music, Science, etc.
	Counseling Therapy: Physical, Speech, etc.
	Assessment

Interview Probe Questions

STANDARD PROBE	After the teacher has given his/her rating of the characteristic, the standard probe should be, Why have you rated the _____ in such a manner? The following probe questions can then be used, if needed.
SURFACES	Does the color or texture of any surface affect any activity?
LIGHTING	Are the type and location of artificial light controls appropriate?
	Can you control the natural light sufficiently?
	Is there glare from the windows?
	Is there too much or too little light for any activity?
ACOUSTICS	Are there conflicts in acoustics between simultaneous activities in this room?
	Are there external noises which affect classroom activities?
CLIMATE	Does the temperature in this room affect the activities at any time during the day or year?
	Is there a need to control the temperature and/or ventilation?
	How is the quality of the air in terms of drafts, odors, humidity?
SPATIAL LOCATION	Are there activities or rooms that should be closer to this room?
	Are there activities or rooms that should be farther away?
	Are there areas or services requiring direct access from this room?
SPACE	How well would this room function with fewer or more children?
	How many fewer or more children would be desirable?
	Does the shape of the room have any effect upon the activities here or their locations within the room?
STORAGE	Are there any materials or equipment which you cannot store?
	Is there any excess storage not utilized?
	Are stored instructional materials visually and physically accessible to the children?
	Is there adequate teaching material storage space?
DISPLAY	Are the display surfaces visually and physically accessible to the children?
	Are the quantity and location of display areas sufficient?
	Are the display surface materials appropriate to their use?
UTILITIES	Is the quantity, location and design of electrical outlets, telephone, intercom, television, toilets, and sinks appropriate to your activity needs?
EQUIPMENT	Are there pieces of equipment that you need that you do not have or are not available?
	Do you have excess or unusable pieces of equipment?
FURNITURE	Are there pieces of furniture that you need but do not have?
	Is the furniture design appropriate to the disability, age, and size of the children?
	Is the furniture flexible and adjustable enough to suit your varied program needs?
	Are the furniture materials durable and easily maintained?
	Do you have excess or unusable furniture?

FIELD FORM E

Aide Classroom Evaluation

School: _____ Researcher: _____
 Location: _____ Date: _____ Time: _____

Aide A	_____	Room Name & Number	_____
Aide B	_____	Room Name & Number	_____
Aide C	_____	Room Name & Number	_____
Aide D	_____	Room Name & Number	_____
Aide E	_____	Room Name & Number	_____
Aide F	_____	Room Name & Number	_____
Aide G	_____	Room Name & Number	_____
Aide H	_____	Room Name & Number	_____

All of these questions relate to the activities in your classroom and its design.

1. Does the material surface of the walls, floor, or ceiling affect any classroom activities?

2. Is the artificial and/or natural lighting appropriate for the classroom?

3. Are there distracting noises from outside the classroom?

4. Is your classroom located in the right place in the school building? Are there rooms that should be closer or farther away?

5. Should there be fewer or less children in the classroom because of its size?

6. Is the quantity and type of furniture appropriate?

7. Are there any teaching materials or equipment which you cannot store?

8. Is the quantity and location of tackboard and bulletin board appropriate?

9. Are there any problems with electrical outlets, toilets, sinks, or other utilities?

10. What one design feature in your classroom would you omit from future schools?

FIELD FORM E (continued)

11. What one design feature in your classroom would you *change* in future schools?

12. What one design feature in your classroom would you *repeat* in future schools?

FIELD FORM F

Student Facility Evaluation

School: _____ Researcher: _____

Location: _____ Date: _____ Time: _____

Student/Disability

Room Name & Number

a. _____	_____
b. _____	_____
c. _____	_____
d. _____	_____

1. Do you have any problems in coming to or leaving the school?

2. Are the outdoor play areas good for playing?

3. Do you have any problems in getting to your classroom or other rooms in this school?

4. Except for your classroom, what is your favorite place in this school?

5. What do you like best about this school building?

6. What do you like least about this school building?

7. Is the lighting in your classroom good for the things you do there?

8. Is your classroom too hot or too cold? At what times of day or year?

9. Is the furniture in your classroom the right size and shape?

10. Do you have a place in your classroom to put your supplies and coat?

11. Are there toilets and sinks close enough to your classroom for you to use?

12. What do you like best about your classroom?

13. What do you like least about your classroom?

D. School Sites Visited

Arcola Lake Elementary
School

1037 NW 81st Street
Miami, Florida 33201

Bassett High School
755 N. Ardilla
LaPuente, California 91746

Chatsworth Special
Education Center
222 New Avenue
Reisterstown, Maryland
21136

East San Gabriel School
4400 N. Roxburgh
Covina, California 91722

Green Mountain Senior High
School
13175 W. Green Mountain
Drive
Lakewood, Colorado 80228

Jefferson Senior High
School

4001 W. 102nd Street
Bloomington, Minnesota
55437

Ken-O-Sha Elementary
School
1353 Van Auken, SE
Grand Rapids, Michigan
49508

Lowell Elementary School
1058 E. Market
Seattle, Washington 98102

Mark Twain School
1551 Avery Road
Rockville, Maryland 20853

McDonald Elementary
School
Street Road
Warminster, Pennsylvania
18974

Mitchell Junior High School
2701 Drexel Avenue
Racine, Wisconsin 53403

Oak Grove Junior High
School
1300 W. 106th Street
Bloomington, Minnesota
55431

Rachel B. Carson Intermedi-
ate School
I.S. #237
46-21 Colden Street
Flushing, New York 11355

Rock Creek Special
Education Center
Route 8
Frederick, Maryland 21701

Sam Houston Elementary
School
37 McKnight
Odessa, Texas 79760

Seward Elementary School
4902 South Alaska
Tacoma, Washington 98408

Southside Estate Elementary
School

9774 Ivy Road
Jacksonville, Florida 33201

Squadron Line School
Simsbury, Connecticut
06070

Whitmer Human Resources
Center
600 Parkhurst
Pontiac, Michigan 48058

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